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ABSTRACT

This is the final report of research oriented to determine the problems and successes associated with women scientists who reenter the labor force. The report deals with the assessment of the strategies used in the National Science Foundation (NSF) Career Facilitation Projects for reentry women. The evaluation focuses on the successful approaches rather than the successful projects. Elements of a successful project, derived from statistical analysis of survey data, are discussed. The report also presents what options and alternatives are currently available to women with backgrounds in science who wish to reenter the work force. Although the focus of the Career Facilitation Program is on the employees and not on the employers, the report presents the results of a survey of personnel officers of companies employing scientists and engineers. The results of another survey, involving science educators and administrators, are given. Participants contributed their responses to the idea of submitting or encouraging others to submit an application for funding for a Career Facilitation Program. Recommendations are given from an eighteen member panel that discussed topics which might have an impact on women who choose to reenter a science profession. (Author/SA)

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REENTRY PROGRAMS FOR FEMALE SCIENTISTS

DENVER RESEARCH INSTITUTE
UNIVERSITY OF DENVER
Colorado Seminary
SOCIAL SYSTEMS RESEARCH & EVALUATION DIVISION

SE 029 429

REENTRY PROGRAMS FOR FEMALE SCIENTISTS

FINAL REPORT

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-With-

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June 1979

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CONTENTS

Page

PREFACE iii

ACKNOWLEDGEMENTS v

LIST OF TABLES vi

LIST OF FIGURES viii

Chapter

1. Background and Introduction 1

2. Determination of Program Priorities 15

3. The Reentering Woman Scientist 26

    Number and Duration of Career Breaks 28
    Incentives to Reentry 30
    Obstacles to Reentry 34
    Estimates of Numbers of Potentially Reentering Scientists 45
    Summary 52

4. Project Participants 55

    Demographic Profile of Participants 56
    Attitudinal and Motivational Profile 64
    Completers and Dropouts 66
    Participant Groupings 71
    Summary 72

5. Participant Outcomes 76

    Behavioral Measures 81
        Project recruitment 82
        Survey response rate 82
        Attrition rate 86
        Employment 86
        Job seeking 92
        School attendance 92
        Differences between dropouts and completers 92
    Perceptual Measures 93
        Knowledge gain 93
        Project rating 93
        Achievement of goals 97
        Willingness to contribute to project expenses 97
        Willingness to relocate 100
    Institutional Outcomes 100
    Summary 101

Page

6. The Necessary Conditions for Project Success 102

    Necessary Conditions 102
    Promising Strategies 107
    Project Institutionalization 117
    Summary 119

7. Contextual Analysis of Factors Affecting the Success of Career Facilitation Projects 121

8. Other Existing Programs for Reentering Women Scientists 127

    Women's Continuing Education 132
    Science Education 135
    Summary 135

9. Employers Survey 137

    Future Hiring 138
    Employers' Perceptions of Reentry Women 139
    Hiring Criteria 141
    Summary 146

10. Science Educators' Views of Career Facilitation Projects 148

    Awareness of the Program 150
    Interest in Implementation 152
    Contribution to Professional Development 154
    Summary 155

11. Panel Report 157

    Panel Findings 158
    Panel Recommendations 164

12. Summary and Conclusions 167

    Summary of Findings 167
    Conclusions and Program Recommendations 176

Appendix

A. Programs for Reentry Women Scientists 191

B. Participants Questionnaire 202

C. Synopsis of 1977 Career Facilitation Projects 210

D. Examples of Science and Continuing Education Program for Reentry Women 259

Page

E. Bibliography of Relevant Science and Continuing Education Programs Contacted 276

F. Employers Questionnaire 284

G. List of Respondents to the Employers Survey 289

H. List of DRI Panel Members 291

BIBLIOGRAPHY 295

INDEX 300

ABOUT THE AUTHORS 304

PREFACE

This book describes the outcome of an extraordinary learning experience for the National Science Foundation, for the project directors, for the participants, and for the evaluation team. The book cannot hope to compile and catalogue all of their unique experiences, nor can it adequately capture the flavor of each individual project. Instead, it attempts to outline the essence of these experiences that might be most useful to other individuals working with educational projects.

The process and the outcome of the program are unique in an era where pessimism and resistance are often expressed toward federal programs that attempt to alter long-standing individual and societal patterns and prejudices. Its origins were not unique; it was initiated without a great deal of forethought, planning, or lead time, and it was, to some degree, pushed under the rug before it was fully implemented.

The program is extraordinary because of the sheer dedication of time, energy, and concern on the part of almost everyone involved. Its monitor at National Science Foundation, Ms. Joan Callanan, provided focused leadership and advocacy and made a genuine effort to continually improve the program. Her attitude of questioning distinguished her efforts from the monitors of many similar programs. The project directors also showed flexibility; they embarked on these projects without much assistance from previous experience, either personal or societal. Their eagerness to learn and to share their learning made many of the projects successful and the evaluation possible. Similarly, the participants entered the projects without knowledge about the outcome. All of these individuals, the NSF personnel, project directors, and participants, (and the evaluation team) devoted untold hours to the program. This time was, more often than not, stolen from other activities and not reimbursed with anything but fatigue and satisfaction.

Ironically, this desire to learn about the objectives set forth in the program and to provide a worthwhile learning experience for the participants inserts a note of pessimism on the future of the programs. It is possible that the dedication and almost missionary zeal cannot be sustained, and that the outcomes described in the following pages will diminish under indifferent management motivated by other than personal concern.

Unfortunately, this cycle from success to "burn-out" is common within many recently evolving programs for women. One element that sets this program apart from many others was its faith in evaluation, a faith losing followers as rapidly as many parishes. It is fervently hoped that the faith was justified and that the compilations of this experience may at least serve as a basis for sharing the learning experience with others if it cannot prevent the "doldrums" that occur in many mature programs.

ACKNOWLEDGEMENTS

I am grateful to the many contributors to this book. I appreciate the information given to us by Ms. Eleanor Babco and Betty Vetter, who prepared the estimates of the numbers of women scientists eligible for the Career Facilitation Program; by Joan Callanan and Linda Ingison of the National Science Foundation; by Michelle Aldrich at the American Association for the Advancement of Science; by the hundreds of survey respondents; and by the project directors. I appreciate the efforts of the panel members in reviewing our ideas and evaluation drafts. These people include Dr. Janet Brown, Dr. Geraldine Bean, Dr. Lili Hornig, Mr. John Alden, Dr. Nell Dale, Dr. Paul Doigan, Dr. Lenore Blum, Dr. Sheila Humphreys, Mr. Robert Henze, and Dr. Ann Briscoe. I wish to express my heartfelt appreciation for the guidance, suggestions, and support given by my husband, Dr. Joseph Halpern. Finally, I would like to thank Dr. Helena Astin, Dr. Rosebeth Cantor, and the National Science Foundation for allowing us to reproduce some of their ideas.

LIST OF TABLES

2.1 Ranking of Long-Term and Intermediate Objectives

2.2 Number of Times Objectives Were Ranked as Most Important by All Groups

2.3 Number of Times Each Objective Was Ranked Most Important by Respondent Group

2.4 Total Rankings of Each Objective

3.1 Problems of Reentering Women

3.2 Estimated Pool of Women Available for Employment in Science and Engineering

3.3 Number of Women Eligible for Career Facilitation Projects

4.1 Percent Listing Reasons for Leaving Last Job or Never Working

4.2 Rate of Project Completion by Participant Major

4.3 Expectations of Career Facilitation Projects in Order of Importance and Perceived Achievement of Expectation

4.4 Participant Groupings

5.1 Project Components

5.2 Project Objectives

5.3 Description of Survey Sample

5.4 Behavioral Outcome of Completed Projects

5.5 Sector of Current Employment

5.6 Ratings of Project Components by Completers

5.7 Perceptual Outcome Measures

6.1 Method of Recruiting

7.1 Social Factors Affecting Career Facilitation Projects

7.2 Economic Factors Affecting Career Facilitation Projects

7.3 Educational Factors Affecting Career Facilitation Projects

7.4 Legal/Political Factors Affecting Career Facilitation Projects

LIST OF TABLES (cont.)

9.1 Strengths and Weaknesses Attributed to Reentry Women Scientists

9.2 Differences Attributed to Reentry Women Scientists and Other Applicants

10.1 Survey Sample of Educational Institutions

10.2 Percentage of Respondents Aware of Career Facilitation Program

10.3 Interest in Implementing Career Facilitation Projects

12.1 Payoffs for Groups Involved in the Career Facilitation Projects

LIST OF FIGURES

1.1 Procedures Involved in the Research

1.2 Information Sources Used in the Research

2.1 Possible Program Strategies to Assist Women with a Bachelor's Degree in Science

3.1 State Distribution of Scientists and Engineers: 1974

4.1 Age of Participants

4.2 Years Since First Degree

4.3 Percent of Time Spent Employed Since First Degree

4.4 Family Income

5.1 Income from Current Job

12.1 Possible Program Strategies to Assist Women with Bachelor's Degrees in Science Retraining Programs

12.2 Possible Program Strategies to Assist Women with Bachelor's Degrees in Science Updating Programs

12.3 Possible Program Strategies to Assist Women with Bachelor's Degrees in Science Career Advancement Programs

1. BACKGROUND AND INTRODUCTION

Traditionally, women have been underrepresented in science-related occupations. Despite the perceived relaxation of stereotyped role expectations, women represent less than 10 percent of the scientific labor force (Kennedy 1977). Lack of female participation in science-related endeavors is apparent even with young girls and increases with age; demonstrating that even among those females who show an early interest in science there is a tendency to begin to move toward more traditional careers as they get older. For example, compared to males:

- A smaller percentage of females show an interest in science in high school (Perrodin 1968; Astin 1968).
- A smaller percentage of females aspire to a science major, and this number steadily declines during the college years (University of Michigan 1974).
- A smaller percentage of females hold degrees in science (National Science Foundation 1977).
- A larger percentage of women drop out of graduate school for nonacademic reasons (University of Michigan 1974).
- A smaller percentage of women trained in science participate in the labor force in science-related careers; estimates of voluntary nonparticipation in science and engineering (S&E) careers run as as high as 47 percent (National Science Foundation 1976).

- A smaller percentage of women trained in science who are seeking jobs are able to obtain employment (National Science Foundation 1976).
- Women employed in science-related careers make less money than males with comparable training, in part because fewer are employed in industry (Chronicle of Higher Education 1977).

Evidence indicates the lack of female participation in science is related to sociocultural factors, rather than ability (Kennedy 1977). While all of the evidence is not in, the situation does not appear to be rapidly changing (Kennedy 1977).

Since science has traditionally been a male dominated field, fewer women consider it as an occupational alternative. Many who like science consider science-related occupations to lack human contact and concerns as well as being incompatible with future family responsibilities. In fact, many science-related occupations are structured so that it is difficult for women to meet family responsibilities and continue working. Many women trained in science choose to remain out of the work force while their children are small and, like their nonscience-oriented counterparts, frequently wish (or are forced) to reenter the labor market after an extended period of unemployment. Dougharty (1975) has aptly summarized the conditions for the successful reentry of housewives into the labor market; (1) they must have retained a certain level of capability in an occupation (either the role requirements do not change and their skills have not deteriorated, or they must have kept up with changes in the occupation), (2) they are able to find jobs requiring skills that may be learned quickly, or (3) they are able to find a job at a skill level lower than that required for their previous jobs. Since the woman wishing to reenter a science-related occupation faces additional difficulties in that her field has advanced rapidly in terms of theory, techniques, and instrumentation during her absence, she typically chooses the latter option. Consequently, many women trained in science reenter the labor force in more traditionally female occupations not requiring an updating of their skills.

Like most social problems, the underrepresentation of women in science consists of a cycle caused by interrelated and self-perpetuating factors; women move steadily away from science at every decision point. There is a great deal of consternation regarding the most effective focus, timing, and method of intervention to break this cycle. The common solution to improving similar social problems has been to invest the majority of effort in the next generation, but this approach ignores more than one-half million women who are trained, but not presently participating in science-related careers. Specifically, if representation of already trained women were greater and more visible, more young women might choose to enter science-related careers. It is possible that concentration on this generation of female scientists has two advantages; greater payoff per dollar investment and a greater likelihood of breaking the underrepresentation cycle.

In an attempt to reach these women, NSF has initiated a series of projects to address the underutilization of female scientists. As described in Appendix A, these projects are designed to assist women trained in science to update their skills so that they may qualify to enter the labor force or to continue their graduate education. The Science Career Facilitation Projects are aimed at women who have received bachelor's or master's degrees in science between two and 15 years ago and who are not presently employed in the fields for which they were trained. The women are provided with an educational experience designed to increase their level of knowledge to that expected of a current graduate. One project was started in 1974, eleven in 1976, and ten in 1977. These projects will serve an estimated [illegible] women (National Science Foundation News 1977).

The program has been in existence since FY 1976. NSF personnel have already expressed a desire to reexamine, in greater depth, the needs and problems of the target population. The NSF solicitation specifically stated that the requested evaluation should provide: (1) a portrayal of existing conditions relating to institutions, the job market, and potential participants, (2) a portrayal of the existing projects, and (3) an analysis of these portrayals to provide information on potential program modifications or alternatives that would best meet the goals of the program.

The questions NSF wished the evaluator to address were the following:

1. Assessment of existing conditions:
    - What is the number of potential participants for Science Career Facilitation projects, i.e., the

number of women in the country with the qualifications and interest necessary to undergo the kind of training provided?

- What are the particular problems or advantages that graduates are likely to encounter?

2. Assessment of projects:
   - What are characteristics that lead to successful career facilitation projects?
   - What promising practices and approaches can be identified?
   - In which fields of science are graduates most likely to find employment?
   - How many institutions have the necessary resources and interest to provide training?
3. Analysis of strategies:
   - Survey of women's groups, employers, scientific societies, educators, policy makers and others to determine whether approaches other than those now being used in the Women in Science Program might be more effective in increasing the number and percentage of women in science.
   - Analyze the information collected to suggest potential program modifications and to draw conclusions regarding broader policy issues.

Frequently, programs are not developed logically and systematically because of time pressures and political systems, but certain assumptions are implicit from the way a program is designed. Direct examination of these underlying assumptions is one means of assessing a program's underpinnings. As outlined above, the request for proposals asks for data relating to its basic assumptions. From inference, the assumptions underlying the Career Facilitation Program were as follows:

1. Women are underrepresented in science-related fields.
2. Science skills become outdated in most scientific fields.
3. Women cannot or do not keep up with the advances in their fields when they are not employed.
4. Women are not able to gain employment in science and engineering after a career break without some update of skills.
5. Science updating for already-trained women is the most important intervention for this group of women.
6. Updating of science skills will produce increased participation of women in science fields.
7. No other alternatives exist for large numbers of women to obtain updating of science skills.
8. There is an adequate number of women with backgrounds in science to justify funding Career Facilitation projects.
9. There is an adequate number of science educators interested in implementing the projects.

10. The projects, on the whole, will provide necessary assistance for the participants to reenter graduate school or employment, and most participants will be satisfied with their experience in Career Facilitation projects.
11. Career Facilitation Projects will provide an educational experience that is credible to employers.
12. Financial assistance beyond tuition is not necessary for program participants.

Assumptions made by at least some of the projects included:

1. Reentry women need some vocational and job readiness counseling.
2. Reentry women need peer support.
3. Reentry women have special scheduling requirements.
4. Self-paced instruction is an adequate method of updating skills.
5. Some women will relocate to obtain updating of science skills.
6. Industrial input is important in establishing program credibility.
7. Industrial internships are an important educational experience for reentry women.
8. Skills needed for reentry into the job market and graduate, school are similar.

The assessment addressed the validity of these assumptions. An overall description of the method of assessment follows.

The evaluation effort is designed to generate the information necessary for the concerned individuals to make these policy decisions. This evaluation attempts to provide an assessment of the needs, incentives, objectives, and constraints of each of the groups necessary to the success of Career Facilitation projects. In essence, the evaluation attempts to present information from multiple sources on multiple topics to policy makers in a useful and comprehensive manner.

The evaluative approach chosen by Denver Research Institute (DRI) was predicated on several assumptions made about the program. First, at least moderate satisfaction with current projects has been expressed, with the exception of recruiting project implementors and applicants (Katzenmeyer 1977). Second, all of the projects initiated by NSF followed the same general approach, which makes them amenable to comparison. Third, NSF will likely be receptive to trying alternative approaches to address the problem of the underrepresentation of women in science-related occupations. Fourth, the program will probably be continued, at least at its current level of funding, and may be expanded. Fifth, diverse opinions about the program's specific objectives have been expressed by NSF policy makers. Finally, NSF has attempted to initiate programs that will have some impact or which will continue after federal funding ceases.

The following objectives were proposed for the evaluation effort:

- To assist in defining and ranking the priority of specific NSF objectives in conducting Career Facilitation projects, i.e., to determine the "value" of possible objectives and alternatives.
- To obtain information from concerned stakeholders regarding their needs, constraints, and incentives for participating in Career Facilitation projects.
- To assess the overall success of intervention strategies implemented by NSF and other agencies.
- To generate a list of alternative strategies to meet each specific program objective which encompasses the needs, constraints, and incentives of the stakeholder groups.
- To convene a panel of experts to rank the program priorities and strategies and to estimate probable outcome for each alternative.
- To produce an abbreviated report containing information useful to potential project directors.

Figure 1.1 outlines the procedures used to meet these objectives, and Figure 1.2 illustrates the sources of information used to accomplish each of the separate tasks.

In order to provide integrated information from the diverse groups interested in the program and to reflect these assumptions, the general survey approach used was consensual validity rather than random sampling. Consensual validity is obtained when information from several small, nonrandom studies concurs.

Figure 1.1. Procedures Involved in the Research

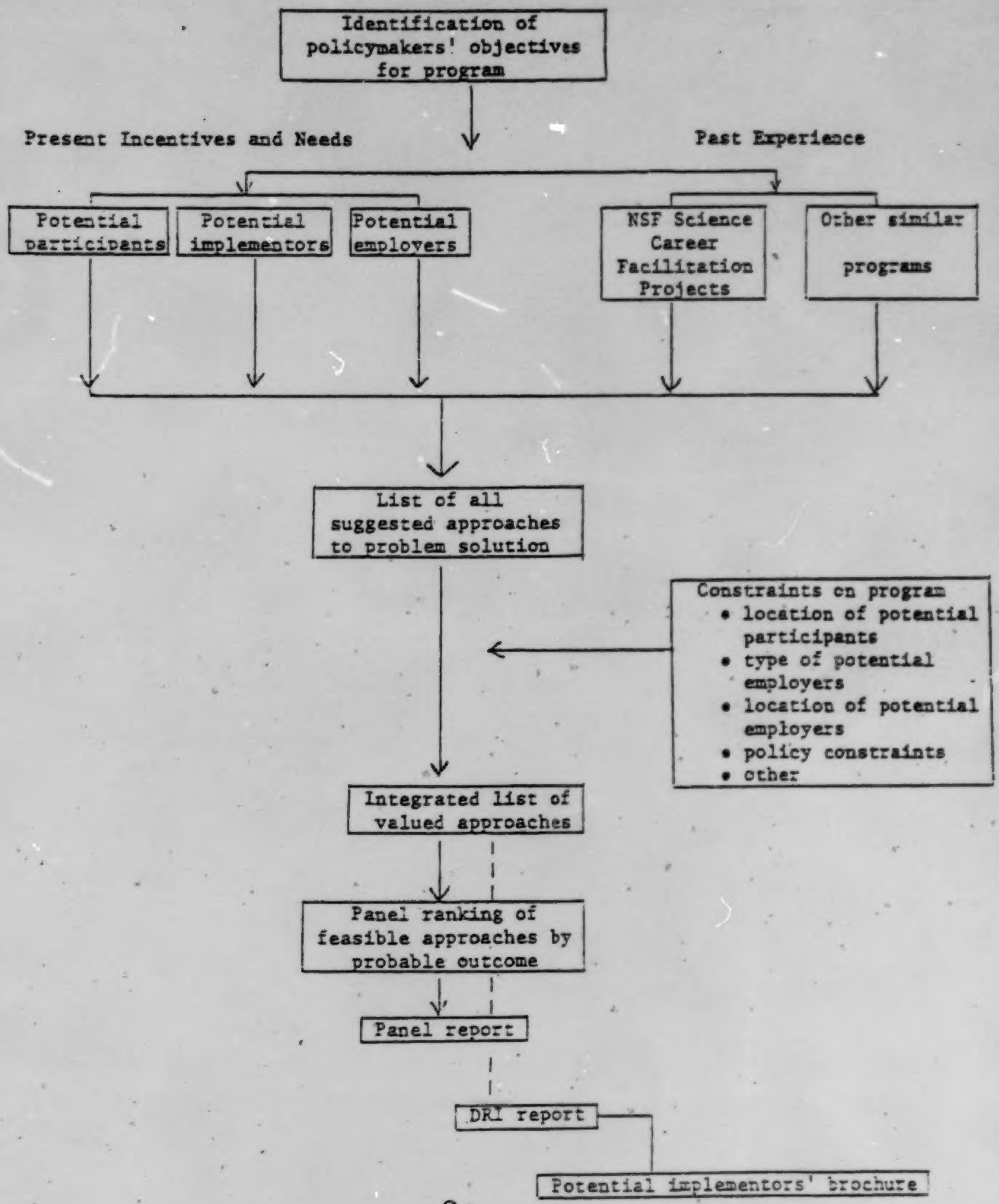
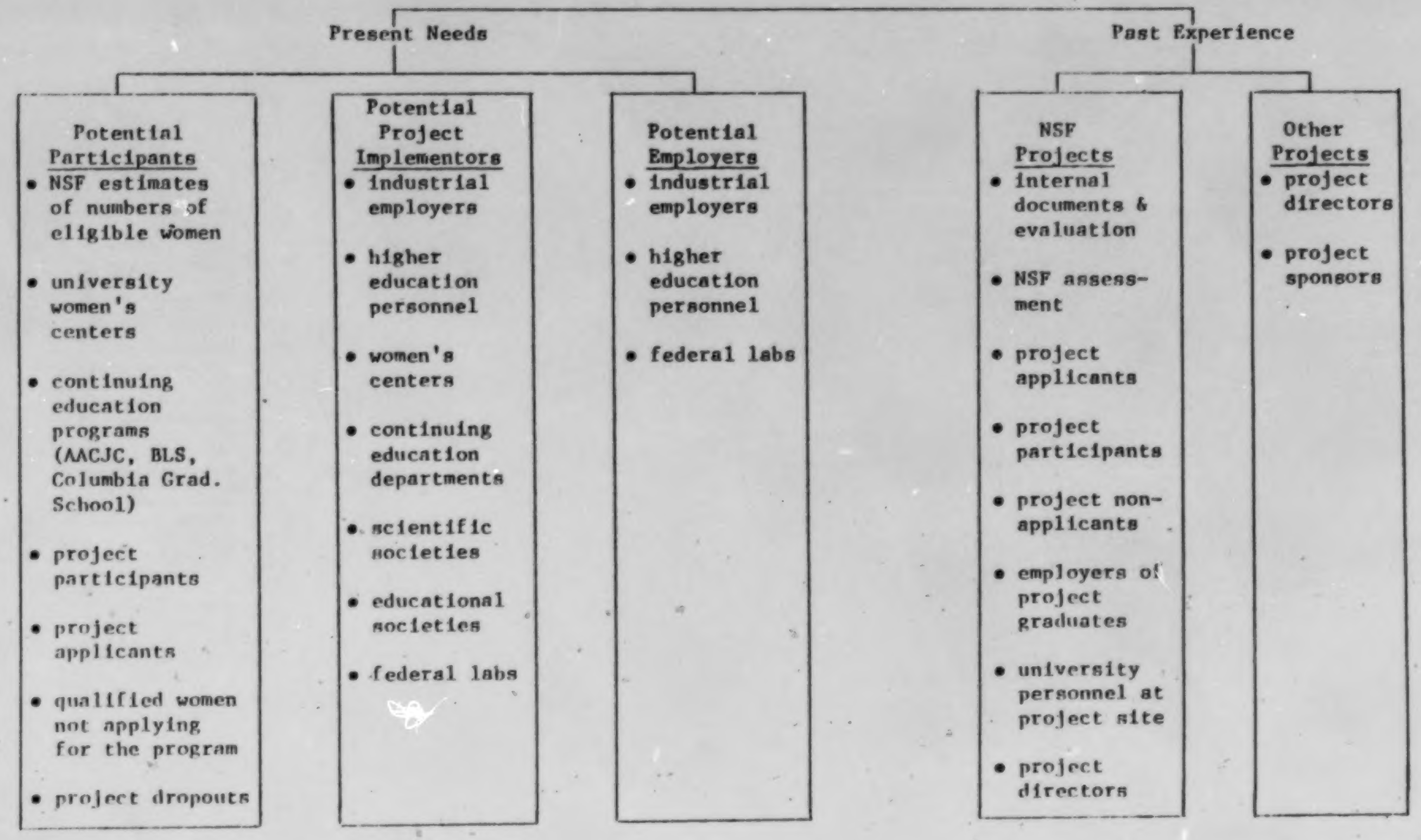

Identification of policymakers' objectives for program
Present Incentives and Needs
Past Experience
Potential participants
Potential implementors
Potential employers
NSF Science Career Facilitation Projects
Other similar programs
List of all suggested approaches to problem solution
Constraints on program
• location of potential participants
• type of potential employers
• location of potential employers
• policy constraints
• other
Integrated list of valued approaches
Panel ranking of feasible approaches by probable outcome
Panel report
DRI report
Potential implementors' brochure

Figure 1.2. Information Sources Used in the Research


Present Needs
Past Experience
Potential Participants
• NSF estimates of numbers of eligible women
• university women's centers
• continuing education programs (AACJC, BLS, Columbia Grad. School)
• project participants
• project applicants
• qualified women not applying for the program
• project dropouts
Potential Project Implementors
• industrial employers
• higher education personnel
• women's centers
• continuing education departments
• scientific societies
• educational societies
• federal labs
Potential Employers
• industrial employers
• higher education personnel
• federal labs
NSF Projects
• internal documents & evaluation
• NSF assessment
• project applicants
• project participants
• project non-applicants
• employers of project graduates
• university personnel at project site
• project directors
Other Projects
• project directors
• project sponsors

Three primary factors indicated the selection of a consensual validity approach: (1) no single population could be identified that would represent all of the concerns of either the Career Facilitation projects' potential participants, potential implementors or potential employers, (2) it is important for policy makers to have information directly comparable across populations; illustrating commonalities in needs, objectives and incentives which can readily be translated into program strategies, and (3) in-depth interviews with varied parties can provide a more detailed and concrete basis for directing the program than superficial responses from a large number of individuals.

The present approach intentionally samples a spectrum of biased population segments. The approach requires knowledge about the vested interests of these groups and cautious interpretation of the results. The survey followed principles of stratified random sampling in some instances, but additionally sampled biased populations to gain maximal information within the constraints of the budget. This method makes it feasible to obtain information from a large number of groups at less expense than random sampling procedures. Additionally, the areas of agreement among nonsimilar, biased populations provide a more robust and valid basis for program direction than could be provided by a single, large random sample.

An identification of program objectives examined the program's antecedents, rationale and subsequent development regarding expected intermediate and short-term objectives and their corresponding outcome measures. In order to accomplish this task, individuals involved in writing the program's enabling legislation, the National Science Board, and relevant NSF program personnel were asked to list the program's objectives. A summary list was compiled to include possible objectives, alternative program strategies and target population(s).

The estimation of the number, needs, and problems of potential participants identified the total size of the target population for the Career Facilitation Program and described the characteristics of this population.

The survey of other stakeholder groups was designed to obtain information from other groups with an interest in the Career Facilitation Program. Information obtained from potential employers provided insight into employers' perceptions of reentry women and the factors important in obtaining a job. A survey of potential implementors of the program provided information on institutions interested in and qualified to administer Career Facilitation projects. Past implementors were asked about the reasons for and the extent of their projects' success, about plans for continuation of their projects and about the recruitment methods which they have used or might use in the future. Other policy makers in scientific and professional associations and their women's caucuses, women's groups and educational organizations were asked to describe their perceptions of the Career Facilitation Program, the need for such programs and the desirable format for these programs.

The evaluation of existing strategies identified non-NSF-sponsored projects which appeared to address the stated NSF objectives. In addition, strategies utilized by other similar programs were identified and assessed. The basic objective of this task was to produce information enabling NSF staff to make modifications if more effective project strategies could be identified. This task also identified the types of programs being conducted for the target population to determine the areas where NSF is providing a unique service.

The panel assessment allowed persons knowledgeable and familiar with programs for reentering women to make suggestions about the usefulness of DRI's evaluation prior to its final submission to NSF and to provide a way to integrate data meaningfully. The panel held a two-day meeting, during which DRI's working papers were discussed and program recommendations generated.

As a result of the absence of previous research in this area, and our limited budget, the following data is frequently drawn from tangentially related fields. The data is sometimes inconsistent in its presentation and its quality and is seldom conclusive. One of the tasks of the panel was to judge the validity of the information and to utilize the information as subjective indicators rather than as objective statements of fact.

In spite of the unavailability of satisfactory data from a researcher's viewpoint, we hope the information will be an adequate base for policy decisions and program planning. Because of the nature and availability of information, we consider the results of this evaluation as suggestive rather than definitive.

2. THE DETERMINATION OF PROGRAM PRIORITIES

An understanding of program objectives and emphasis is necessary both to an evaluation of existing projects and to the development of alternative methods of intervention. In addition, a historical knowledge of program development is necessary to understand its current form. The development of the Career Facilitation Program was explored and information regarding expectations and goals for the program was gathered from all of the individuals involved in the program design.

One long-term goal of NSF is to increase the participation of women in science. NSF has initiated a series of projects focusing on unemployed* women, but it did not appear to DRI researchers that there was a consensus on activities most appropriate to assisting these women. A plethora of programs and activities exist that could be used as mechanisms to update science skills (Lantz and West 1976) and an even larger range of alternatives is available to increase the overall participation of women in science.

Decisions regarding which of the many alternative mechanisms to fund are difficult when specific intermediate or short-term objectives have not been clearly delineated (Wholey, et al. 1975). Objectives more specific than increasing the participation of already-trained women in science-related careers might include any of the following: increasing the number of women in graduate science departments, increasing the number of women employed in S&E, increasing the opportunities for advancement of women scientists, increasing job satisfaction of women in S&E, increasing institutional responsiveness to women, project continuation without federal support and initiation of similar projects in other institutions.

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*It is the impression of DRI that the projects were primarily aimed at unemployed women, although a substantial number of project participants were currently employed.

While objectives may not be mutually exclusive, emphasis on certain objectives will dictate project design. For example, if the primary objective of the program is to increase the number of women employed in science and engineering, projects should emphasize applied skills, job readiness, entry level examinations, job placement, jobs in the participants' locales within industry and/or government and internships. On the other hand, if the primary objective is increasing the number of women in basic research in university positions, projects should emphasize theoretical knowledge, located in universities with graduate science departments and excellent laboratory facilities and function within degree programs. Although DRI identified the objectives and priorities envisioned by policy-makers for the programs to assist women scientists, it is frequently difficult to rank the priority of objectives without knowing the feasibility and cost of alternatives or the need for them.

The information regarding past conceptualizations and development of the Women in Science Programs was obtained from three major groups influencing program development, the members of Congress involved in writing the enabling legislation; those involved in setting policy for NSF (the National Science Board); and NSF program personnel (who translated the opinions of all groups into operational terms and designed project specifications). From these discussions a list of objectives, potential sponsoring institutions, alternative strategies and target populations was compiled.

Figure 2.1 illustrates the form of this preliminary list and some of the different short-term and intermediate objectives that might be used to accomplish the long-term goal. For example, when the long-term goal of the program is to increase the participation of women in science, the intermediate objective may be to increase the labor force participation of women who are already trained and the short-term objective may be to increase the applied science skills of women who never had or who have lost those applied skills.

Unless there is valid evidence, it is not safe to assume that the accomplishment of short-term objectives will automatically result in the accomplishment of long-term goals. Specifically, even if the short-term objective of increasing applied skills is accomplished, there is no guarantee that participants will either seek or obtain a job. Recognition and awareness of short-term objectives is essential for program design and evaluation, since they are more specific than intermediate objectives or long-term goals and, consequently, dictate the actual interventions utilized.

A pilot survey using the chart shown in Figure 2.1 demonstrated that the format was too complicated for easy completion. The chart was collapsed to a list illustrated in Table 2.1, and respondents were asked to rank the various alternatives in order of importance.

FIGURE 2.1. POSSIBLE PROGRAM STRATEGIES TO ASSIST WOMEN WITH BACHELOR'S DEGREES IN SCIENCE

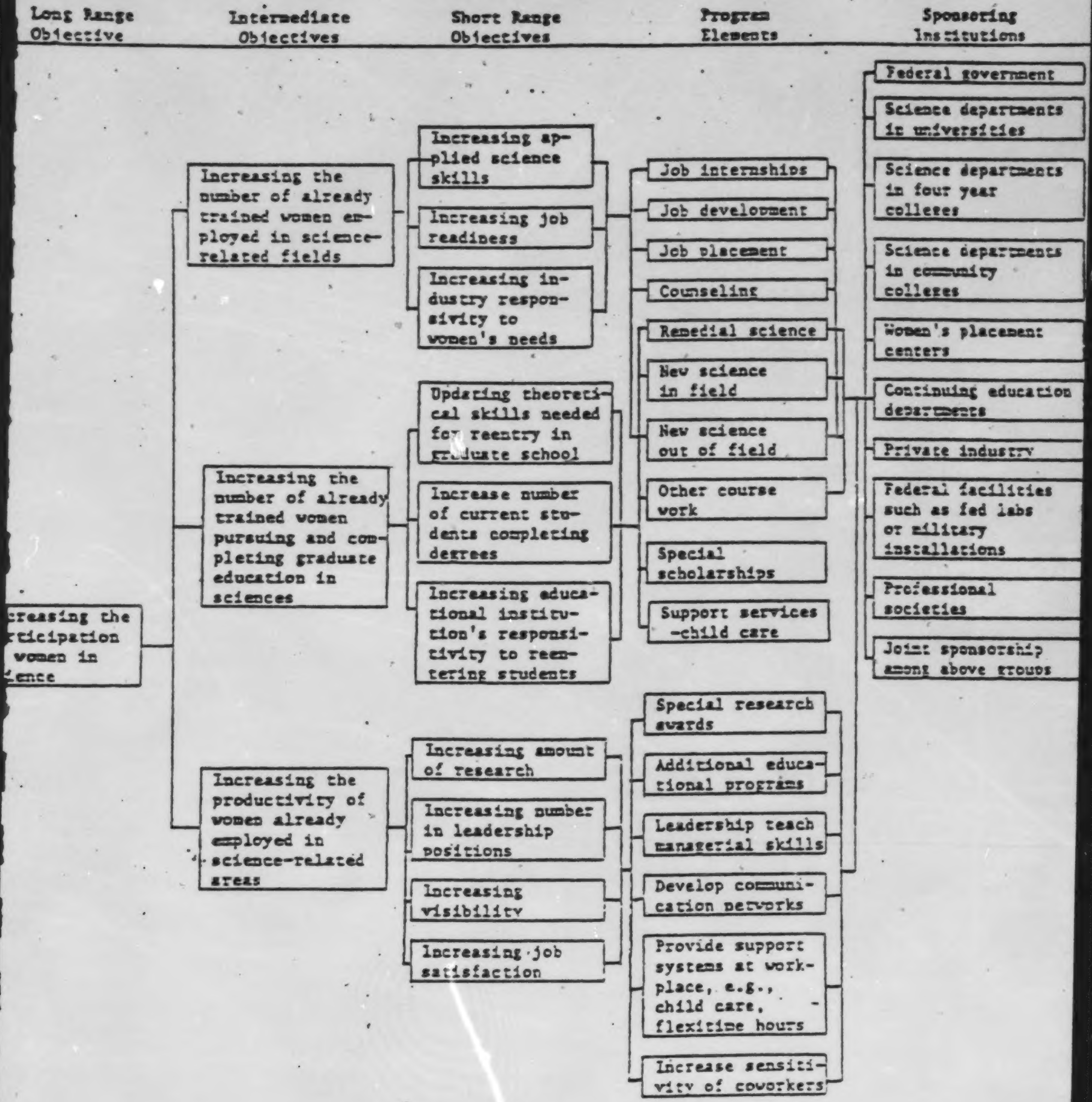
Long Range Objective
Intermediate Objectives
Short Range Objectives
Program Elements
Sponsoring Institutions
creasing the rticipation women in ience
Increasing the number of already trained women employed in science-related fields
Increasing the number of already trained women pursuing and completing graduate education in sciences
Increasing the productivity of women already employed in science-related areas
Increasing applied science skills
Increasing job readiness
Increasing industry responsivity to women's needs
Updating theoretical skills needed for reentry in graduate school
Increase number of current students completing degrees
Increasing educational institution's responsivity to reentering students
Increasing amount of research
Increasing number in leadership positions
Increasing visibility
Increasing job satisfaction
Job internships
Job development
Job placement
Counseling
Remedial science
New science in field
New science out of field
Other course work
Special scholarships
Support services -child care
Special research awards
Additional educational programs
Leadership teach managerial skills
Develop communication networks
Provide support systems at workplace, e.g., child care, flexitime hours
Increase sensitivity of coworkers
Federal government
Science departments in universities
Science departments in four year colleges
Science departments in community colleges
Women's placement centers
Continuing education departments
Private industry
Federal facilities such as fed labs or military installations
Professional societies
Joint sponsorship among above groups

TABLE 2.1. RANKING OF LONG-TERM AND INTERMEDIATE OBJECTIVES

The results showed the following ranking for the long-term objectives:

Long-Term Objectives

Rank	Objective
1	Increasing the number of women with science degrees employed in science (a majority of the respondents)
2	Increasing the number of women entering/completing graduate school
3	Increasing productivity

The results indicated the following ranking for the intermediate objectives:

Intermediate Objectives

Rank	Objective
1	Increasing opportunities for advancement
2	Increasing number of women in leadership positions in S&E
3	Increasing number entering/completing graduate school
4	Increasing visibility of women employed in S&E
5	Increase applied skills of underemployed women
6	Increase job readiness of underemployed women
6	Increase university support for women in S&E
8	Increase the quality and quantity of research done by women in S&E
8	Increase number of jobs available to women in S&E
10	Increase theoretical skills
11	Increase job satisfaction

The first round of the survey was sent to the following groups: U.S. Congress (House Committee on Science and Technology, and Senate Committee on Scientific and Technical Resources); the National Science Board; appropriate staff at NSF; and proposed panel members. One person at the Office of Management and Budget and one NSF board member were interviewed personally.

As anticipated, the response rate was not high. Those individuals within each group who were expected to be the most interested in the programs were the ones who responded: 80 percent of the panel, 56 percent of the Science Board, 42 percent of NSF staff, and an abysmal 7 percent of Congress.

The results showed the following ranking of intermediate objectives: (1) increasing the number of women with science degrees employed in science, (2) increasing the number of women entering/completing graduate school, and (3) increasing the productivity of already employed women.

The results contained a basic inconsistency, i.e., the objective of productivity was ranked last in the intermediate objectives, but subobjectives thought to be related to increasing productivity were ranked highest among the short-term objectives. Several factors probably contributed to this effect: First, productivity was a poor choice of words, implying a "blame the victim" syndrome. Second, most of the respondents were women who might benefit from increased opportunities and visibility. Finally, the respondents were naturally inconsistent in ranking the objectives.

The correspondence received regarding the objectives was interesting, occasionally hostile--everything from "there is not a problem now" to "ask not what science can do for women, but what women can do for science." The most obvious problem illustrated by the correspondence and comments was that the research staff was not sufficiently clear in defining the target group, i.e., already-trained women.

A second round of the survey based on the first round results was mailed to respondents and nonrespondents. Policy makers from other professional and scientific organizations and women's groups were also surveyed. On the second survey, only three major objectives were listed. They were:

- Increasing opportunities for advancement, visibility, and leadership among already employed women.
- Increasing the number of women with backgrounds in science employed in S&E fields.
- Increasing the number of women entering and completing graduate school (either directly from college or after an absence from school or labor force).

The results of the second survey showed that the respondents overwhelmingly thought that programmatic emphasis should be placed on increasing the opportunities for already employed women. In fact, as illustrated in Tables 2.2, 2.3, 2.4, a significantly greater number of people emphasized programs for already employed women.*

One final note on policy--the National Science Board held regional forums in 1978 and the National Opinion Research Center posed some additional (mostly open-ended) questions for participants to consider. In response to a question:

> 92 percent and 93 percent of all (177) respondents said NSF should continue support for training programs for minorities

(p. 21)

*Since many of the respondents could personally benefit from programs designed to increase the opportunities for advancement of already employed women, an analysis was run excluding the responses of these women. The analysis still showed the results to be significant.

TABLE 2.2. NUMBER OF TIMES OBJECTIVES WERE RANKED AS MOST IMPORTANT BY ALL GROUPS*

Increasing employment of already-trained women	Increase numbers entering/completing graduate school	Increase opportunity for advancement for currently employed women	Total
6	10	30	46

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*The observed frequencies were significantly different ($p > .01$) than expected when tested by X^2($X^2 = 11.84$, df = 2). Estimated number of currently employed women scientists responding was 7.

TABLE 2.3. NUMBER OF TIMES EACH OBJECTIVE WAS RANKED MOST IMPORTANT BY RESPONDENT GROUP

	Increasing employment of already-trained women	Increasing number entering/completing graduate school	Increasing opportunity of advancement of already-trained women	Not usable	Total Responses
National Science Board	1	5	10	3	19/25
NSF Staff	2	2	0	0	4/7
Congress	0	3	5	4	12/37
Panel	1	0	7	0	8/10
Other Policy-makers/ Professional Organizations	2	0	8	1	11/43

TABLE 2.4. TOTAL RANKINGS OF EACH OBJECTIVE

	Increasing employment of already-trained women	Increasing number entering/completing graduate school	Increasing opportunity for already-employed women	Total Responses
Ranked #1	6	10	30	46*
Ranked #2	12	22	7	41†
Ranked #3	23	12	6	41†

*The observed frequencies were significantly different ($p<.001$) than expected when tested by X^2($X^2 = 22.06$, df = 2). Estimated number of current employed women scientists responding was 7.

†Some people ranked only a single item.

and women respectively. This huge level of support for continuation of training activities was in marked contrast to all respondents' opinions regarding the distribution of research funds. While special programs for training were endorsed, opinion was almost four to one against preferential treatment for research grants to these groups.

[However, the] participants favored the approach of focusing upon precollege students as potential scientists rather than utilizing existing funds to support graduate students from minority groups and who are women (National Opinion Research Center 1978).

In sum, although NSF has choosen to emphasize programs for trained unemployed women scientists, many of the other policy makers in the area of scientific human resources felt that emphasis should be placed on increasing the opportunities for advancement, visibility and leadership among women currently employed in science and engineering careers.

3. THE REENTERING WOMAN SCIENTIST

There is no reason to assume that women with backgrounds in science differ dramatically from their sisters in certain demographic, attitudinal, or motivational characteristics.* This section attempts to highlight the general, but fragmented, information about women's discontinuous work patterns and to discuss the incentives and barriers to reentering the labor market. Later sections of the chapter attempt to estimate the number of women scientists available and desiring to reenter the job market.

While there is an abundance of information available on the motivations and problems of reentering women, the literature focuses either on women reentering educational settings or on women not having a bachelor's degree, e.g., CETA and welfare assistance programs. Literature is primarily derived from superficially designed and analyzed surveys or opinions and/or anecdotal evidence of individuals working with the reentery women. In an article discussing the problem of obsolescence in science careers, Bell et al. (1976) stated:

> The literature on the factors that affect the labor force activity of women is voluminous. However, there has been considerably less research on the problems of role conflict, role sequencing, retraining activity and educational needs that women often experience.

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*The evidence from the participants survey shows that the women in the Career Facilitation projects are typical of reentry women in most respects.

> Moreover, in spite of the rapid increase in the number of programs that purportedly address the needs of women, there have been no broad-based surveys to ascertain their needs. Hence, it is difficult to assess the adequacy of the emerging system of educational programs for mature women . . . Little is known about women's career development, and models for adequately formulating and developing career goals do not appear to exist. Only recently have data about the level of enrollment by mature women been collected; and data on the characteristics of these women only now are beginning to be collected. Moreover, there appear to be no current efforts to assess critically the effectiveness of the educational system in helping women reach their labor market objectives (p. 64).

In addition, while discussing the role of education in facilitating adaptation to technological change for women, Bell, et al. (1976) continue to explain:

> It is apparent that there is a tremendous need for research in this area. Perhaps the most striking discovery of our literature search was how little is known, beyond the level of assumption or anecdote. We have no idea, for example, how many women are affected by obsolescence or how many women would

> work if barriers to their employment were removed (p. 56).

Finally, Daniels (1975), in discussing continuing education programs, states:

> We need information not only about the women currently enrolled in such programs--their backgrounds, their goals, and their progress--but also about the women who might be involved if they could be reached and if more programs were available to them (p. 32).

This chapter, derived from a literature search on reentering women combined with the survey of the participants, represents an exploratory effort in this area. The majority of the discussion on the incentives and barriers is taken from the literature describing women reentering education, but it is considered to be relevant to women wishing to return to work, since reentery to education is often an intermediate step to employment.

Despite the unreliable data base for almost all of the studies, there was an amazing amount of concurrence regarding the problems and motivations of reentering women. Since all of the assumptions made by the studies of women reentering education were verified in their essence by the participant survey of women scientists (discussed in Chapter 4), the ideas presented in this chapter are assumed to be related to women scientists.

Number and Duration of Career Breaks

There is no reliable information describing the number of women scientists choosing to take a career break, nor the number and duration of such breaks. Almost all of the available evidence on women scientists has been obtained from small samples with special characteristics. For example, Vetter (1978) surveyed science alumae from several schools. She found that, of the currently employed engineers and chemists, 26 percent had had career breaks for reasons other than school and an additional 14 percent had taken career breaks to return to school. Approximately 40 percent of the women had taken career breaks.

The women in the Vetter survey who were not currently employed indicated that they had been out of the labor force for varying lengths of time. The length of time since last employment was as follows:

Not employed for more than a year	81%
Employed within the last year	12%
Employed within the last three months	4%
Never employed	3%

Forty percent of these women had been out of the labor force between five and ten years since college graduation, although almost all had been employed previously. Most had taken only a single career break. (This break may have been continuous until the present time.) Only one-quarter had more than a single career break, e.g., had reentered the labor force more than a single time.

Connolly and Burks (1975) surveyed career motivated women belonging to professional societies and reported that about 36 percent of the respondents indicated that they had had career interruptions. While the average duration of their breaks was two years, 25 percent of those interrupting their careers had only a single break, 8 percent had had more than one, and only 3 percent had had more than two.

In sum, available evidence suggests that around forty percent of all women scientists drop out of the labor force at some point in time.

Perhaps the most important characteristic of the reentry woman is that she is in the process of personal, situational and social transition. She is typically moving from a traditional, noncareer, family orientation that she has followed for several years; towards a professional orientation. Deanna Chitayat (1978) comments about the transition and its concomitant ambivalence:

> The decision to stay home is both desirable and undesirable, the decision to go to school (or work) is both desirable and undesirable. Staying at home propels her toward school/work; the thought of school/work (and all its risks) propels her back home. She can neither be content at home nor can she move towards school (p. 17).

The following sections describe the factors contributing to this ambivalence and outlines the incentives and barriers involved in the decision.

Incentives to Reentry

Several studies have indicated that many women return to school/work during "middle motherhood." This period is often a time of renewed identity crisis and a second period for career exploration (Bart 1972; Manis and Mochizuki 1972). Particularly for the married woman who has a family but holds no job, demands on time and energy are reduced during this period when her children are in school and her husband is involved in a career. Resulting feelings of being less needed or less useful, together with the pressure of advancing age, generate serious questions regarding her identity, role and feelings. For many such women, an attempt to deal with these questions results in the decision to return to school or the work force. On the other hand, some women return to school for the very pragmatic purpose of earning a few credits or taking a particular course and then become stimulated to think about the potential offered by additional education.

These general motivations are further elaborated by Brandenburg (1974), who questioned a sample of reentering women about their reasons for returning to school. The women said: "I want to grow up and find my own identity." "I need constructive interests outside the home." "I desire self-fulfillment." "I want self-improvement, confidence, my own identity." "I'm feeling stagnant and want a meaningful career." "I need to find myself as a person." "I seek financial independence, meaningful employment" (p. 12). Similarly, Marple (1972) reported that 75 percent of a group of women in continuing education programs stated a "wish to fulfill their own ambitions" as the reason for returning to college. Two of the incentives to reenter the labor force, then, are a search for identity and self-fulfillment and an alleviation of the feeling of boredom and uselessness resulting from decreased family obligations.

Although not emphasized in the literature, some of the "identity crisis" experienced by this age group of women may be a result of the changing expectations of and for women. They are being squeezed by social changes, they grew up with the expectation of filling the role of wife and mother and are currently experiencing an expectation that they fill additional roles. This creates a transitional role reflecting the transitions of society. Most women are not prepared for the transition. This conflict between upbringing and current expectations is demonstrated by the problems and pressures reentering women report (these are discussed in a later section). The combination of situational life cycle factors and social change prompts these middle motherhood women to search for personal fulfillment and direct achievement roles. Another reason for reentry is the changing expectations of and for women concerning their role.

Reasons far more specific than the search for identity and self-fulfillment have been summarized by Astin (1976). She comments:

> A review of the literature shows that women who decide to continue their education can be divided into two large groups: those whose ultimate goal is a career (or at least employment) and those who want to take some courses or a few seminars out of general interest, perhaps to complete a degree, but who have no intention of seeking employment. Within that first large group, there are several subgroups. Many women must go to work to support or help support themselves and their families, so they come to continuing education programs to gain marketable skills

47

or to update long-unused ones . . . A second subgroup comprises women who have jobs but who have found that without a college degree, they have no opportunity for advancement. A third subgroup consists of those who have been employed for a number of years and who are now preparing for mid-life career changes, either out of dissatisfaction with their current jobs or because rapid changes have made their jobs obsolete. The fourth subgroup, and probably the largest proportion of women in continuing education, consists of those whose family demands have lessened and who now find work a viable and appealing opportunity.

The women who enter programs for reasons other than employment may be motivated by a variety of factors. Perhaps they are simply interested in learning more about the revolutionary advances occurring in so many fields; the rapid proliferation of knowledge has made education a life-long endeavor. They may be drawn by purely avocational interest. They may find they are bored; their husbands are busy, their children are in school or grown up, and volunteer activities no longer seem satisfying. They may be taking refuge from marital and family problems. Finally, many women who enroll in degree programs do so because they left college to work

> or get married and only now find themselves in a position to complete the course work toward the degrees they began working for previously (pp. 50-51).

Obstacles to Reentry

Many of the obstacles to reentry include problems with family care, which is one of the prime reasons for taking a career break. Providing for family care is an expensive endeavor and, unless the woman can make a substantial salary, it is not always economically advantageous to return to work.

A survey by Solmon, analyzed by the Scientific Manpower Commission (1975), indicated that among 441 women science and engineering graduates who were currently out of the labor force, 61 percent said that they did not want a job and 35 percent said that they might like a job, but were not currently looking for one. The women in this group were asked to indicate the obstacles contributing to their decision to remain out of the labor force. The reasons, in order of importance, were:

- Voluntarily caring for family.
- Prefer volunteer work.
- Cannot find a part-time job.
- Spouses discourage working.
- Cannot find a job.
- Apprehensive about a job search.
- Caring for family/no alternative.

Vetter (1978) asked the chemistry and engineering women graduates their reasons for not wishing to return to the labor force. Of those women who were not currently employed, the vast majority cited family reasons for their decision to remain out of the work force. The only other reason cited with any substantial frequency was a geographical move.

The women in the Vetter (1978) survey were asked to list the factors that negatively affected their careers and 39 percent indicated some barriers. As shown below, in order of importance, the most frequently cited barrier was having one or more young children at home, followed by other demands of their time, and the demands of their husbands' careers. These factors were also listed as having the most impact.

- One or more young children at home.
- Other demands on time (family, social).
- Little financial incentive to work.
- Unsatisfactory job opportunities.
- Inadequate household help.
- Demands of husband's career.
- Geographical location of jobs.

These women surveyed by Vetter expressed concern for the lack of part-time positions in scientific and/or technological fields. The responsibilities of full-time jobs were felt to be too time consuming for many of the women with families. One women said it well, "Besides wanting to care for my young children, I am not eager to join the nine to five rat race. When I look for employment, it will be something with a flexible schedule, possibly self-employment."

Another problem expressed by the women was the lack of proper training. These women felt programs for updating technical and job skills were needed and without these programs they would be hesitant to reenter the labor force. Several of the women who were not employed viewed their educational background in science to be a source of enjoyment or a "job" rather than a full-time career. The final problem brought out by the survey was the lack of financial incentive to reenter the job market. Many women would rather be at home with their children than have a slightly increased family income.

A survey of individuals representing the women's caucuses of scientific and technical organizations was conducted by DRI as part of this evaluation. The respondents were asked to identify and rank the most important barriers to reentering science-related careers. The most frequently mentioned items in order of importance were:

- Being perceived as a good employment candidate.
- Having necessary self-confidence to get a job.
- Having the required work experience.
- Being female (discrimination).
- Having the necessary academic skills.
- Being older than the average employee.
- Resistance of husband.

Connolly and Burks (1975) surveyed 2,000 career-committed women who belong to professional organizations, and reported that these women felt that the lack of access to suitable jobs and balancing careers with family life were the major obstacles to employment.

Many reentry women have for a long time been subverting their own needs and interest to those of others. Frequently they have gone from being dependent on their parents to being dependent on their husbands and have not developed a strong sense of worth and identity. According to Lopata (1971) and Self (1969), this dependency may produce resentment toward self and family, fear of taking risks and depression. A resulting lack of confidence may be further reinforced by limited opportunities to achieve success outside of the family. Consequently, for these women, the decision to continue their education or reenter the labor force is both important and difficult. In the words of one women, "I'm scared! I want to do well--better than I did before. It's my second chance, and I must take it--not only to prove to myself that I can do it, but my whole future is at stake" (Brandenburg 1974, p. 12).

Several surveys of reentering women have been conducted to determine their needs and several individuals working with reentry women have reported their needs and problems. A summary of the identified needs of the reentry women is given in Table 3.1. Since the surveys asked different questions, used different geographic locations and were conducted at different times; a check mark has been used to indicate whether that author/survey considered that item to be a significant problem for reentering women.

Going somewhat beyond the Table, it is our opinion that the most specific psychological problems a reentry woman brings to the academic/industrial setting are:

TABLE 3.1. PROBLEMS OF REENTERING WOMEN

	Astin, 1976	Magill & Cirksen, 1978, anticipated problems	Magil & Cirksen, 1978	Durchholz & O'Connor, 1975	Brandenburg, 1974	Gray, 1975	Kelman & Staley, 1974	Aanstad, 1972	Letchworth, 1970	Likert, 1967	Gump & Rivers, 1975
Practical Problems											
Family obligations	✓	✓	✓			✓		✓	✓	✓	✓
Child Care				✓	✓	✓	✓	✓			✓
Academic counseling, career guidance			✓	✓		✓	✓			✓	
Time of Classes	✓	✓									✓
Discrimination, school procedures, stereotyped attitudes				✓	✓					✓	
Costs	✓	✓	✓			✓				✓	✓
Rusty study skills		✓									
Lack of specific skills	✓	✓									
Location, distance, transportation	✓	✓	✓								
Inadequate information			✓								✓
Lack of time, energy, endurance	✓	✓						✓			
Emotional Problems											
Lack of self-confidence	✓	✓	✓		✓				✓	✓	✓
Guilt	✓		✓						✓		
Isolation from peer group			✓				✓		✓		
Practical & Emotional Problems											
Nonsupportive family attitudes	✓		✓		✓	✓		✓		✓	
Lack of direction/purpose	✓	✓									

- Inadequate vocational information. Typically, many reentering women return to school with a narrow view of the areas available to them. Many of these women need to consider a broad range of courses, majors and occupational possibilities. They need to know the realities of the job market with respect to age, sex and field. Awareness of the existing job conditions should not limit choices, but rather encourage realistic decisions and suggest strategies for gainful employment in areas where possible difficulties may exist.
- Ambivalence and confusion about career goals. This may stem from several sources. Women are not socialized as men are towards a career mentality from childhood. Studies have shown that women tend to view careers in the short run, as jobs or tasks, with none of their own identity attached to them. A decision to have a long-term career is a radical new direction for which the woman may be unprepared psychologically and practically.
- Low self-image, self-esteem. Compounding the "doctor's wife" syndrome of identification with another individual is the fact that many women are trained to be modest; building self-esteem seems like bragging. Any activities the woman undertook for which she took no pay are automatically downgraded by the woman; building self-esteem based on past activities may be difficult. The low self-esteem woman will

have little or no confidence in her abilities, no confidence in her strengths, despite past evidence to the contrary.

- High anxiety, fear of failure. Numerous studies have commented on the low-risk behavior of women and linked this with the "fear of failure/success" syndrome. Reentry women compound this anxiety with a fear that "this is it--now or never." They enter the classroom both highly motivated and highly anxious. Additionally, academia is a new world. Even if the woman obtained her degree three to five years ago, she still feels rusty and does not know what to expect from herself or the institution. Consequently, anxiety is usually extreme at evaluation/testing periods.
- Time management. Without a doubt, management of time is one of the primary difficulties of reentry women. Many simply attempt to add the additional responsibilities of school to an already full schedule of family and social activities. They begin to feel overwhelmed and at a loss as to how to manage their time more effectively.*
- Guilt. Management of guilt feelings is another concern. The sources of the woman's guilt feelings are varied and stem from her conception of womanhood. She feels that she is selfish when she neglects the full responsibilities of her home, her children and her husband. She feels selfish

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*This was the major source of attrition in the Career Facilitation projects (cf. p. 63).

when she spends money on education; depriving her family of material advantages. These feelings of guilt stem from the notion that the wife's primary sphere is the home and that her family's interests should be placed above her own.

- Isolation. Isolation is a problem for a few returning women. They feel that they will not be able to relate to their younger classmates and will be alone in the college culture. Isolation is real and should be expected. These women do not make a career of college as do the younger students; they go to their classes, do their assigned reading in the library and then return home. They have little time or need for the "frills" of an education, such as attending lectures or participating in extracurricular activities that would mitigate their feeling of isolation.
- Absence of professional identity. Many of the women are searching for an identity to augment the one of wife/mother. Having viewed themselves in other than an employment role, they have no sense of identity with the professional role their major field prepared them for. The reentering woman must not only learn to cope with her new identity as a student, but she must also learn to identify with the profession to which she aspires.

In conclusion, the reentry women returning to college or work are confronted with many personal, situational and societal problems. These women have distinctive needs on both psychological and practical levels. Meeting these needs requires a special effort on the part of colleges, employers, husbands, children and friends. Thus, it is important that counselors understand the needs of these women and plan and implement programs to assist women in moving through the reentry process.

Brooks (1976) has viewed the reentry process as a series of stages. These stages may benefit a project director with a framwork for both assessment and intervention for reentry women. While the reentry process will seldom occur in an orderly progression, awareness of issues involved in each stage will help the director assess unresolved issues, anticipate future stresses and plan effective interventions. The scheme of stages discussed below is a compilation of Matthews' (1969) model for vocational counseling with adult women.

The stages of reentry fall within two broad categories, (a) preparation and (b) decision making. Tasks of the preparation phase involve removing psychological blocks that prevent commitment to exploring new roles and options. Tasks of the decision making phase involve assessing abilities and interests, and generating, selecting and implementing goals and options. The preparation and decision making framework recognizes that self-exploration is necessary before the individual can begin to investigate possible directions and make choices that implement a preferred lifestyle (Seay, 1973).

The series of stages includes:

- Vague discontent. Many women begin the reentry process feeling a confusing discomfort about their present life. They may feel bored and depressed but unable to pinpoint the difficulty. "Sometimes the individual questions her personality, blaming herself rather than understanding the factors contributing to her vague or inarticulated discontents" (Manis and Mochizuki 1972, p. 595).*
- Inner preparation. The potential reentry woman tentatively decides she wants to become involved in new roles outside the home. She then faces such questions as: "Do I really want to enter the competitive world?" "What if I don't make it?" "How will my family and friends react?" "I'm not sure what I want to do--is it worth the risk of trying to find out?" Matthews points out that this stage cannot be fully resolved without the actual experience of either attending school or obtaining a job.
- Intensive family involvement. Before a woman can fully commit herself to serious exploration of her options, she often needs to share her new thinking with her family, a process which can prevent later conflicts. "Many a woman's misunderstanding and conflicts stem from her family's lack of qualitative involvement in the decision making process" (Matthews 1969, p. 118).
- Assessment of abilities and interests. Career development approaches recognize the need to identify abilities and

(p. 43)

*Many of the project directors in the more intense projects reported considerable complaining and hostility among the participants. They attributed this to a combination of the dissatisfaction of the women with their lives and with their anxiety about reentry.

interests. Such identification is not an easy task for a woman who has few experiences outside the home; who views her successful years as wife and mother as requiring no special talents; who undermines her many accomplishments in various community organizations or in her husband's business because she did not receive payment for these activities.

- Generating alternatives. With a clearer assessment of abilities and interests, the reentry woman needs to be encouraged to dream and fantasize about her own life goals and aspirations. Schlossberg (1972) noted that "women, like all groups whose vocational development has been arrested, need special help in stretching, in raising their aspiration level, and in raising their consciousness" (p. 137) because their societal situation has often limited their dreaming.
- Narrowing alternatives and value clarification. Having generated alternatives, the reentry woman is ready to reduce her options through clarifying life and work values. The basic question is "What alternatives will allow me to implement my preferred lifestyle?" Value clarification is particularly important for women who have multiple talents and interests. Frequently, they feel confused and view their indecisiveness as a personal inadequacy.
- Implementation and goal setting. A woman may enter this stage with a clear goal, while others will have only a

broad sense of direction and will need to engage in trial experiences in order to make specific plans.

Estimates of Numbers of Potentially Reentering Scientists

As seen in Table 3.2, there were approximately 900,000 baccalaureate degrees awarded to women in the physical, life, mathematical, and social sciences from 1960-61 through 1975-76. There were about 100,000 master's degrees and 12,000 doctorates awarded to women in these fields during this period. In order to estimate the number of women trained in science and engineering, only the baccalaureate degrees have been used; higher level degrees granted to women undoubtedly were included in the baccalaureate numbers (i.e., women who received either a master's or a doctorate in science and/or engineering more than likely received a baccalaureate earlier in science and/or engineering). Thus, an estimate of the number of trained women scientists and engineers is approximately 900,000.

To obtain some estimates of current labor force participation of women who have been trained in science and engineering, two sources were used. An estimate of approximately 250,000 women working in science and engineering positions in 1977 was obtained from the Employment and Earnings series of the U.S. Department of Labor. However, it is not possible to tell what degrees these women held, or whether they were degreed at all. The National Science Foundation (1976) estimated a total of 96,000 employed women in all fields of science and engineering

TABLE 3.2.

ESTIMATED POOL OF WOMEN AVAILABLE FOR EMPLOYMENT IN SCIENCE & ENGINEERING

FIELD[3]	Total Women Trained[1]	Total Women Employed[2]	Eligible Women
Physical Scientists	38,961	14,000	25,000
Mathematical Scientists	120,061	7,000	113,000
Computer Specialists[4]	4,607	21,000	(16,400)
Environmental Scientists	5,624	1,800	3,800
Engineers	6,503	5,000	1,500
Life Scientists	170,127	18,000	152,000
Psychologists	216,793	15,000	202,000
Social Scientists	334,153	13,000	321,000
ALL FIELDS	895,849	96,000	800,800

[1] Includes those women granted baccalaureate degrees during the period 1960-61 thru 1975-76.

[2] Figures obtained from the National Science Foundation for the year 1974.

[3] The following field breakdowns were used as defined by the National Science Foundation.

Physical Scientists - chemists, biochemists, physicists and astronomers
Mathematical Scientists - mathematicians and statisticians
Computer Specialists - computer science
Environmental Scientists - geologists, earth scientists
Life Scientists - biological scientists and agricultural scientists
Social Scientists - anthropologists, economists, political scientists and sociologists

[4] The field of computer specialists is somewhat different that other fields. The figure for total women trained includes only those who received a degree in computer science, while the figure for total women employed includes all those employed in the field even though many undoubtedly received their degree in a closely allied field, such as mathematics.

SOURCE: *Professional Women and Minorities - A Manpower Data Resource Service*, 2nd Edition, Scientific Manpower Commission, November 1978; original source: Earned Degrees Conferred Series, U.S. Office of Education, NCES, and *Women and Minorities in Science and Engineering*, National Science Foundation, NSF 77-304 in 1974. By adding the number 1974 and 1975 cohort of college graduates known to be working in science or engineering (National Science Foundation 1976), the same estimate of approximately 250,000 women working in science/engineering positions was derived from the National Science Foundation data.*

The U.S. Department of Labor estimated that during 1977, women who had completed at least four years of college participated in the labor force at a rate of 62.3 percent. Assuming that women who had completed at least four years of college in science/engineering fields participated at the same rate, the total employment in all fields in 1977 for women with four or more years of college who had baccalaureates in science would be 520,000--[900,000 - 65,000 (number of women baccalaureate graduates currently in graduate school) x 62.3 percent = 520,000].

Using this national average rate of employment among college educated women, if approximately 520,000 of the women with backgrounds in science or engineering are employed, and approximately 250,000 are employed in science, approximately 270,000 of the eligible population are already employed in other fields, e.g., somewhat over half of the women eligible for Career Facilitation Projects may be under employed in nonscience-related jobs.†

Dr. Lewis Solomon of the Higher Education Research Institute collected data on the freshman class of 1961 who had not recieved an advanced degree by 1971. The Scientific Manpower Commission analyzed

(p. 47)

*This estimate of current participation agrees closely with the data available from small or specialized sample surveys. These studies, as well as the estimates derived from a Vetter analysis of NSF data, indicate the participation rate to be around 65 percent.

†These figures are a minimum estimate since they do not include elementary and secondary school science and mathematics teachers, who comprise a substantial portion of past Career Facilitation participants.

a sub-sample of women science and engineering graduates in 1975. Women scientists and engineers who were out of the labor force when surveyed in 1975, reported being optimistic about their return to the labor force. In fact, about 60 percent of the currently unemployed women indicated that they plan to return to work. The estimated time of return was:

Currently seeking	5%
Never plan to be employed	7%
Return within one year	9%
Return between one and five years	36%
Return in more than five years	10%
Uncertain when they will seek a job	33%

Based on a 60 percent return rate, DRI estimated that 189,000 of the women with bachelor's degrees in science or engineering who are currently unemployed, would like to return to the labor force although not necessarily in science/engineering (i.e., 60 percent of 315,000 = 189,000).

Using data obtained from the Solomon/Scientific Manpower Commission surveys and examining a number of other surveys on reentering women, an estimated 40 percent of women or 76,000 would wish to reenter the labor market in science/engineering (i.e., 40 percent of 189,000 = 76,000).

The data collected by Dr. Solomon and analyzed by the Scientific Manpower Commission indicate that about 50 percent or 157,000 of the currently unemployed women planned to return to work within five years (i.e., 50 percent of 315,000 = 157,500).

Using the 40 percent estimate of the women who wish to return in science and engineering, a total pool for the next five years is

63,000 (i.e., 40 percent of 157,000). However, no attempt was made to add any new entrants to this pool for the next five years, and there would be a significant number to be considered.

The estimate of 63,000 is an extremely conservative estimate of the number of currently unemployed women who would like to return to the labor force in science and engineering in the next five years. It does not include the group of 270,000 women who are currently working but may be underemployed or wishing to work in the field of their major. If only half of these were interested in retraining in science, a conservative estimate of the probable demand for the Career Facilitation Projects is approximately 333,000.

There are several obvious and major difficulties even in these general estimates summarized in Table 3.3. For example, the final figures and estimates can be best generated when the population for Career Facilitation Projects is better defined, i.e., will the projects include women who are underemployed, or employed in other fields and who have social science backgrounds? Should education majors with science or math minors be included?

The attitudes of society toward women and women's behavior is changing so rapidly that the reliable estimates generated this year may be totally incorrect and outdated in the very near future. The available information suggests that the number of interested women will likely be increasing in the future.*

Finally, the classical dilemma between indicating interest and actually completing the intention--between motivation and behavior--confounds

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*See Chapter 7 on Contextual Analysis.

TABLE 3.3. NUMBER OF WOMEN ELIGIBLE FOR CAREER FACILITATION PROJECTS

1.	Total trained from 1960-76	900,000[1]	
2.	Total in graduate school	65,000[2]	
		835,000	
3.	Total employed in science/engineering	250,000[3]	
	Total Pool Eligible		585,000
4.	Total working in other fields	270,000[4]	
	Total Not Employed Eligible for Career Facilitation Projects		315,000
5.	Total wanting to reenter the labor force	189,000[5]	
6.	Total wanting to reenter the labor force in science/engineering fields	76,000[6]	
7.	Total wanting to reenter labor force in next five years	157,500[7]	
8.	Total wanting to reenter labor force in science/engineering fields in next five years	63,000[8]	

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1. Data obtained from National Center for Education Statistics, see Table 3.2 and supply section under "Estimates of Numbers of Potentially Reentering Scientists." Of this figure approximately 550,000 have been trained in the social sciences.

2. Number of women in graduate school in 1977 is approximately 65,000, as derived from data collected from the National Science Foundation.

3. Total employed in science/engineering derived from two sources: National Science Foundation and U.S. Department of Labor (see explanation).

4. Number derived using U.S. Department of Labor data (835,000 x 62.3 percent = 520,000 - 250,000 (number working in science/engineering positions) = 270,000). (See explanation).

5. Number derived by taking 60 percent of 315,000 (see explanation).

6. Number derived by taking 40 percent of 189,000 (see explanation).

7. Number derived by taking 50 percent of 315,000 (see explanation).

8. Number derived by taking 40 percent of 157,500 (see explanation). Does not include new entrants from 1977 or subsequent classes who wish to reenter the labor force.

any estimates of interest in reentry. Additionally no reliable estimates of either number of career breaks or reentry patterns for any group of women currently exist that might serve as a basis for predictions.

Perhaps the most reliable indicator of interest is the number of applications received by the present Career Facilitation projects. Two years after the initiation of the projects, a great many women are expressing interest in the program--about 1,000 inquiries were made to fill 400 slots. These figures are indicative of the demand for the projects, and suggest that the number of interested women is adequate to justify continuing to sponsor Career Facilitation projects.

Estimating the current geographical residence of the unemployed female scientist population is nearly impossible. Figure 3.1 shows that the NSF generated distribution of scientists and engineers generally follows geographic density. Anecdotal evidence and evidence from the participant survey indicated that many women scientists are married to men working in related fields;* therefore, Figure 3.1 may be used as a broad guideline to the location of the population eligible for Career Facilitation projects.

Summary

Very little research on the reentry woman has been conducted, although the available evidence indicates that approximately 40 percent of the college trained women have career interruptions. There are many reasons why women choose to return to college and or the labor force,

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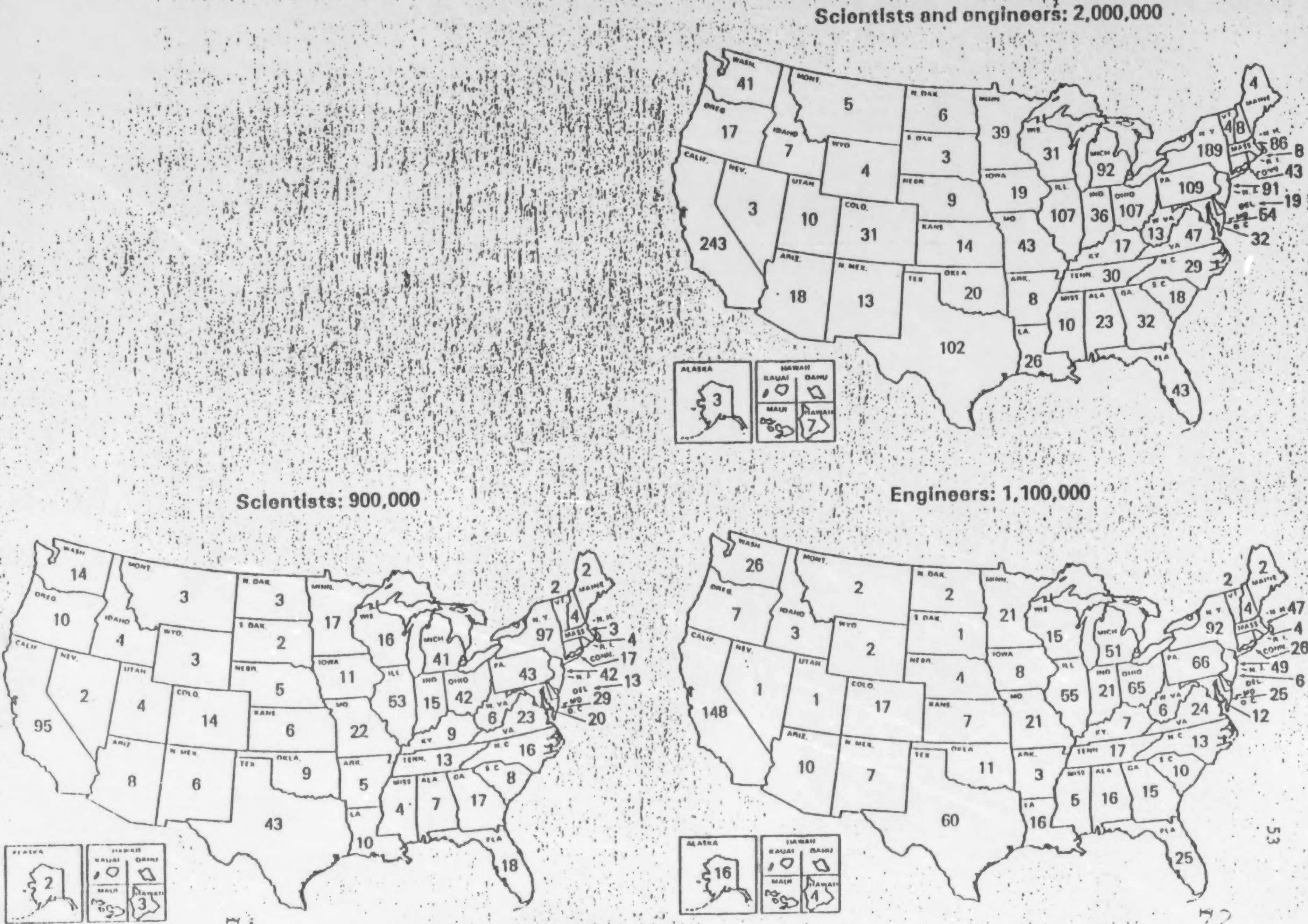
*Over one-third of participants reported to be married to men in closely related fields.

Figure 5.P. State Distribution of Scientists and Engineers: 1974 (in thousands)



Scientists and engineers: 2,000,000

WASH. 41
OREG. 17
CALIF. 243
NEV. 3
IDAHO 7
MONT. 5
WYO. 4
UTAH 10
COLO. 31
ARIZ. 18
N. MEX. 13
N. DAK. 6
S. DAK. 3
NEBR. 9
KANS. 14
OKLA. 20
TEX. 102
MINN. 39
IOWA 19
MO. 43
ARK. 8
LA. 26
WIS. 31
ILL. 107
MICH. 92
IND. 36
OHIO 107
KY. 17
TENN. 30
MISS. 10
ALA. 23
GA. 32
FLA. 43
S.C. 18
N.C. 29
VA. 47
W. VA. 13
PA. 109
N.Y. 189
VT. 4
8
MAINE 4
N.H.
MASS. 86
R.I. 8
CONN. 43
N.J. 91
DEL. 19
MD. 54
D.C. 32
ALASKA 3
HAWAII
KAUAI
OAHU
MAUI
HAWAII 7

Scientists: 900,000

WASH. 14
OREG. 10
CALIF. 95
NEV. 2
IDAHO 4
MONT. 3
WYO. 3
UTAH 4
COLO. 14
ARIZ. 8
N. MEX. 6
N. DAK. 3
S. DAK. 2
NEBR. 5
KANS. 6
OKLA. 9
TEX. 43
MINN. 17
IOWA 11
MO. 22
ARK. 5
LA. 10
WIS. 16
ILL. 53
MICH. 41
IND. 15
OHIO 42
KY. 9
TENN. 13
MISS. 4
ALA. 7
GA. 17
FLA. 18
S.C. 8
N.C. 16
VA. 23
W. VA. 6
PA. 43
N.Y. 97
VT. 2
4
MAINE 2
N.H. 3
MASS.
4
R.I.
CONN. 17
N.J. 42
13
DEL. 29
MD.
D.C. 20
ALASKA 2
HAWAII
KAUAI
OAHU
MAUI
HAWAII 3

Engineers: 1,100,000

WASH. 26
OREG. 7
CALIF. 148
NEV. 1
IDAHO 3
MONT. 2
WYO. 2
UTAH 1
COLO. 17
ARIZ. 10
N. MEX. 7
N. DAK. 2
S. DAK. 1
NEBR. 4
KANS. 7
OKLA. 11
TEX. 60
MINN. 21
IOWA 8
MO. 21
ARK. 3
LA. 16
WIS. 15
ILL. 55
MICH. 51
IND. 21
OHIO 65
KY. 7
TENN. 17
MISS. 5
ALA. 16
GA. 15
FLA. 25
S.C. 10
N.C. 13
VA. 24
W. VA. 6
PA. 66
N.Y. 92
VT. 2
4
MAINE 2
N.H. 47
MASS.
R.I. 4
CONN. 26
N.J. 49
6
DEL. 25
MD.
D.C. 12
ALASKA 16
HAWAII
KAUAI
OAHU
MAUI
HAWAII 1

SOURCE: National Science Foundation

including financial need, self-fulfillment, alleviation of boredom, and an opportunity to advance in their current jobs. There are also many barriers to reentering the work force including the absence of part-time or full-time jobs in the vicinity, discrimination, and low salaries. There are also logistical problems of family demands and care.

DRI estimated that a total of nearly 585,000 women trained in science and engineering are eligible for the Career Facilitation Projects. Of this number, perhaps 270,000 are currently working in other fields. Of course, the number of women interested in reentering in science and engineering at any given year is much lower, but in excess of current project availability.

4. PROJECT PARTICIPANTS

The major emphasis of the evaluation effort was to assess the needs, objectives, and constraints of the reentry women scientists. Since little secondary data was available, the objective could be accomplished by asking project applicants. This secton contains the information derived from the participant survey and profiles the women trained in science who contacted the projects. It describes their demographic characteristics, their aspirations and attitudes, and their expectations. It also delineates their problems and constraints and defines some of their attitudes.

The names for the survey were obtained from each institution which sponsored a Career Facilitation Project. They were to provide a list of names and addresses for (1) project participants; (2) project applicants, i.e., individuals who applied to the project but who were not selected to participate; (3) project withdrawals, i.e., individuals who started the project but did not complete it; (4) no shows, i.e., individuals who applied, were accepted but did not show up on the first day of the project; (5) inquiries, i.e., individuals who inquired about the project but did not apply; and (6) any other individual who in some way expressed interest in the project. These individuals were all sent questionnaires and a follow-up letter if they had not responded within a given period of time. A copy of the questionnaire is included as Appendix B. A total of 1,142 surveys were sent.

As discussed in detail in the next chapter, the response rate varied dramatically by project from a low of 45 percent to a high of 88 percent.

More participants responded to the survey than did applicants, withdrawals or inquiries. The overall response rates for 1976 and 1977 participants were 75 percent and 73 percent respectively. The following analyses were based on a sample of 691 responses. The final distribution included in the analysis is shown below.

Status	Number of Respondents
Completers	216
Dropouts	82
Currently Attending	102
Applicants	178
Inquirers	105
Unaware of Programs	7
Other	1
Total	691

Demographic Profile of Participants

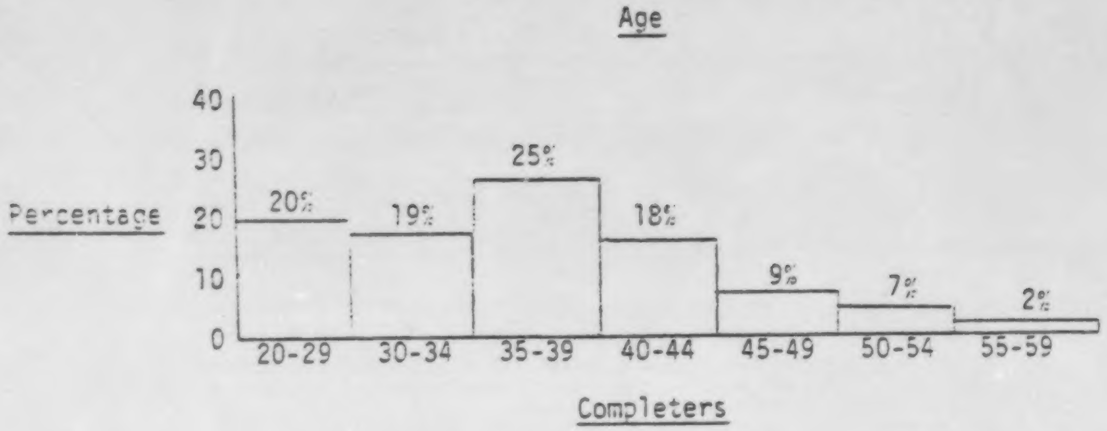
The following characterizes the "average" Career Facilitation participant:

- She had only a bachelor's degree (72%); most of the remainder had a master's degree.
- She was married (63%); almost one quarter were single, and only 13.5% were divorced. Over one-third were married to men who worked in related areas.
- She had a bachelor's degree in chemistry (27%), biological sciences (24%), mathematics (21%), or in the social sciences (10%).

- She did not relocate for the project (82.5%).
- She was not working while attending the project (56%).
- If she was working, she was working full-time (50%).
- She was in her thirties (44%), 21% were in their twenties, and 27% in their forties. The age distribution is given in Figure 4.1.
- She received her science degree within the last 15 years; the distribution of the time since their first degree is given in Figure 4.2.
- She had worked previously (93%); the distribution of the percentage of time worked since the first degree is given in Figure 4.3.
- She had not been employed for more than ten years (33%); with the rest evenly split between not working less than 1 year (22%), 1-5 years (22%), and 6-10 years (22%).
- She was a middle class woman and had adequate family income; the distribution of family income is given in Figure 4.4.
- She received her degree from a well-known university such as a large state school or private eastern school; although some had graduated from the hosting institution, the number of women receiving degrees from less well-known schools or schools offering minimal education was small.
- She reported leaving her last job for family-related reasons; the distribution of reasons given by those having a career break are given in Table 4.1.
- She reported that the primary reason for working in a field not related to her major was an absence of jobs.

The most interesting aspect of the above profile of the woman scientist is that it agrees in most aspects with the profile of the general population of reentry women discussed in the previous chapter, with the exception of education and income. It seems logical to conclude that reentry women scientists share many characteristics with the typical reentry woman.

FIGURE 4.1. AGE OF PARTICIPANTS



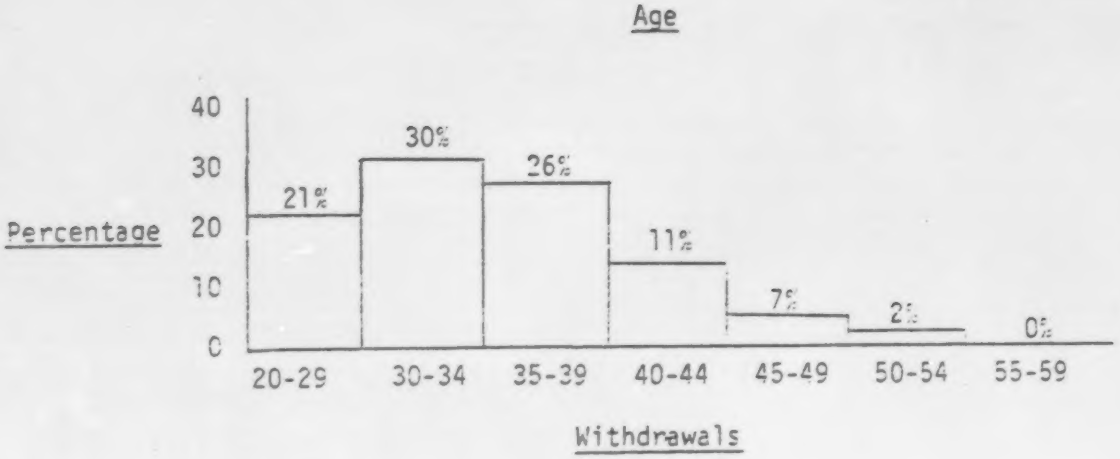
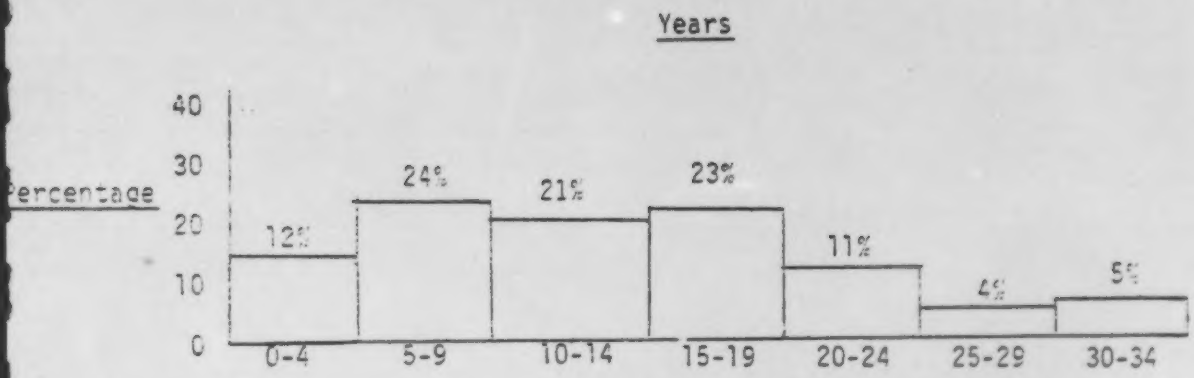
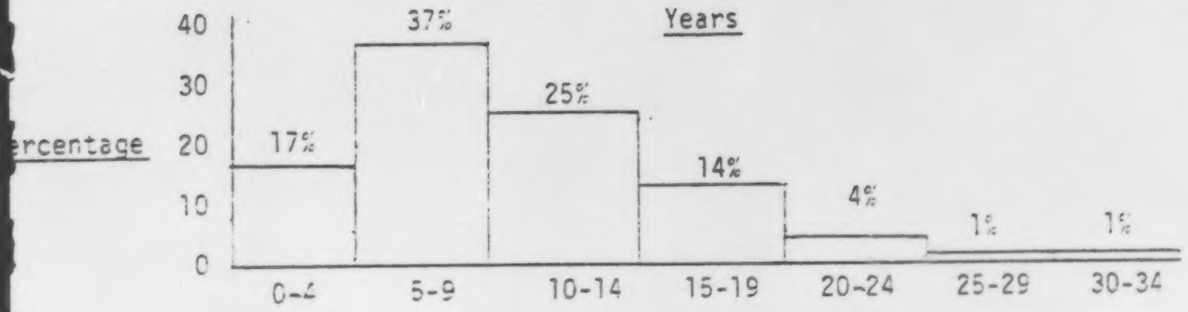


FIGURE 4.2. YEARS SINCE FIRST DEGREE

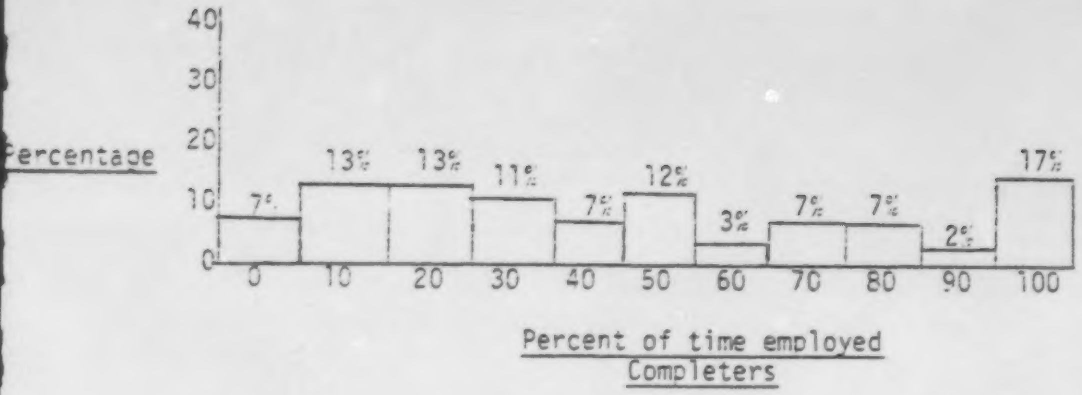


Completers

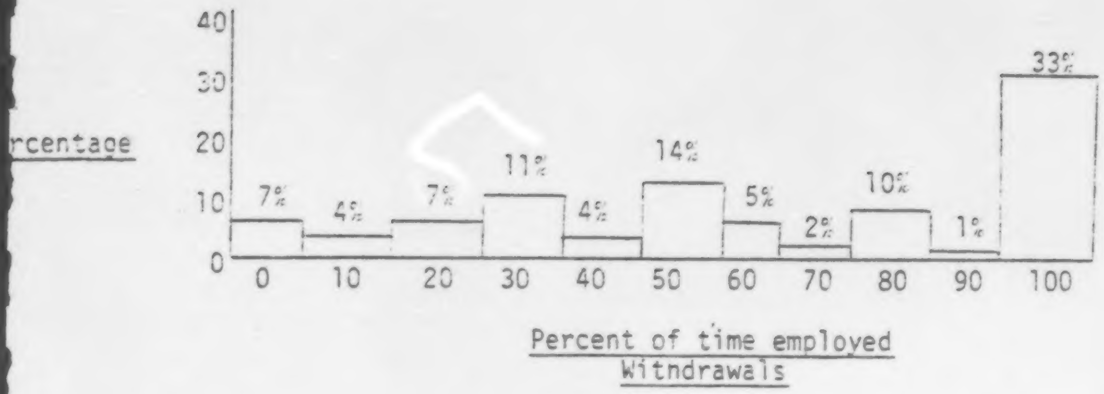


Withdrawals

FIGURE 4.3. PERCENT OF TIME SPENT EMPLOYED SINCE FIRST DEGREE

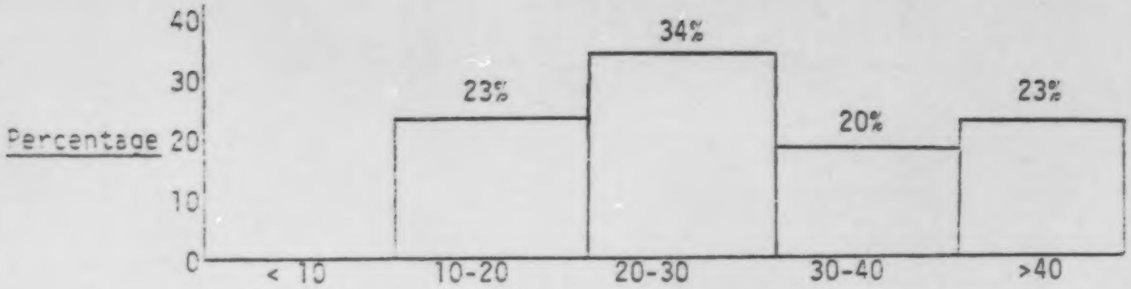


Completers

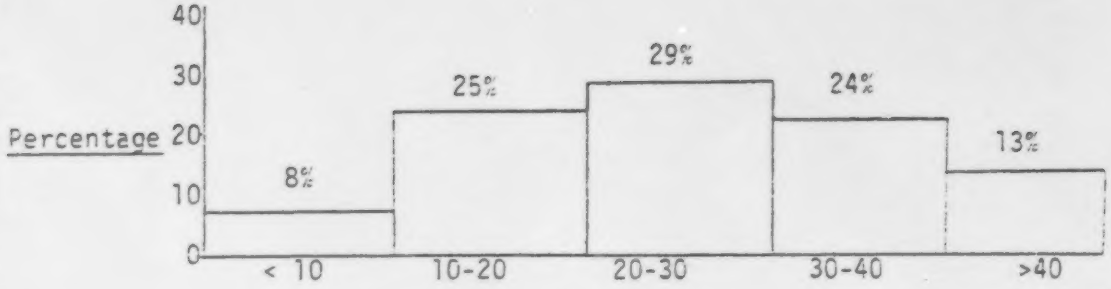


Withdrawals

FIGURE 4.4. FAMILY INCOME



Completers



Withdrawals

TABLE 4.1. PERCENT LISTING REASONS FOR LEAVING LAST JOB OR NEVER WORKING

Reason	Percent
Quit to enter Career Facilitation Project	3.3
Pregnancy	14.3
Family obligations	11.4
Return to school	2.9
Laid off	.5
Family moved	7.1
Salary too low	1.4
Get married	1.9
Other	6.8

Attitudinal and Motivational Profile

All the respondents were asked to subjectively rate the importance of 17 potential reasons for wanting to work. Factor analyses of the responses yielded five factors which accounted for 59 percent of the variance. The factors in descending order of importance were:

- Educational/Professional Development
    - To develop my potential
    - To use my education
    - To learn as much as I can
- Housework Avoidance
    - To avoid staying home
    - To avoid housework
- Financial Necessity
    - To obtain good benefits
    - To make a living
- Personal Development
    - To use my hobbies or interests
    - To be a member of a team
    - To meet interesting people
- Extra Income
    - To earn extra family income
    - To pay for my children's education

Development of professional and educational goals was the most important reason for project participation. This was followed in importance by the more negative reasons of avoiding housework and financial necessity. This finding also shows conformity between the "typical" reentry woman and the reentry woman scientist, and again demonstrates the commonality between the reentry woman and the reentry woman scientist.

The factor scores compiled for each woman were compared across schools and showed that the participants had very different reasons for entering the projects, but the reasons were reasonably consistent with each project. The motivations were analyzed against later employment but showed that reasons for project participation did not predict later employment. In other words, the original motivation for entry did not predict later employment. This finding suggests that many participants may have altered their motivation during project participation.

All respondents were asked to rate the likelihood of occurrence of certain situations for women who work, i.e., to anticipate the consequences of employment. Factor analyses of the responses yielded four factors which accounted for 59 percent of the variance. The factors in descending order of importance were:

- Employment Problems
  - Have bosses who hassle or harass you
  - Success on job causes others to dislike you
  - Have trouble with your family accepting your work
- Demands on Time/Family
  - Takes too much time away from your family
  - Takes too much time away from personal and social activities
  - Have trouble finding dependable people to take care of your children
- Performance Problems
  - Have trouble doing what's expected of you at work
  - Have trouble keeping up with other workers
- Opportunity
  - Good opportunity for promotions
  - Good opportunity to keep your skills up-to-date
  - Makes you independent of family

The participants anticipated more problems than rewards and opportunities to occur with employment. Nonetheless, none of these factors appeared to predict later employment, i.e., the negative view of employment did not appear to affect whether a participant sought and found a job.

Completers and Dropouts

To determine the characteristics of women who successfully completed the projects and to assess the impact of the projects on the participants, a discriminative function analysis was conducted between those individuals who completed the project and those who withdrew. The analysis showed the following significant differences between the two groups:

- Completers were older ($p < .05$).
- Completers had higher family incomes ($p < .01$).
- Completers had more children between the ages of 6 and 12 ($p < .05$) and children over 12 ($p < .05$), and dropouts had more children under the age of 6 ($p < .05$).
- Completers more often reported considering other educational or job-related programs prior to participating in the Career Facilitation projects; specifically, 43 percent of the completers but only 36 percent of the dropouts had considered other educational programs, and 35 percent of the completers but only 31 percent of the dropouts had considered other job preparatory programs.
- Dropouts were more often not U.S. citizens.
- Dropouts were more likely to be working while participating in the project ($p < .05$).

No differences were observed between the two groups in marital status, nor in their fear of handling math. Almost half of both completers and dropouts reported trepidation about the mathematics required by the project.

Analysis of the problems that completers and dropouts reported dealing with upon entering the Career Facilitation projects yielded the following differences:

- More completers reported anxiety about their ability to successfully cope with the university/college environment ($p < .05$).
- More completers reported no problems ($p < .05$).
- More dropouts reported problems finding time to study ($p < .058$). While not statistically significant, it may be practically significant because of differences reported previously such as family income and age of children.
- More dropouts reported commuting/transportation problems ($p < .05$).

The most frequently cited reason for withdrawal from Career Facilitation projects was that the schedule of the project was too demanding, followed by the reason of difficulty adjusting to the school environment. The percentage of dropouts listing each reason for withdrawal is given below:

Reasons	Percent Citing Reason
Schedule of project too demanding	56
Too difficult to return to school environment	32
Interfered with family life	5
Missing data	6

As seen in Table 4.2, the discipline of college major also significantly varied between completers and dropouts ($X^2 = 29.4$, $df = 10$, $p < .001$). Although some of the numbers are small and were confounded by project selection procedures and curriculums, the results suggest that biology and social science majors may have more difficulty in completing the projects.

Completers and dropouts were asked what they hoped to achieve as a result of the project and whether they had achieved it. The responses to these questions are shown in Table 4.3. The table shows that completers and dropouts had about the same expectations of the Career Facilitation projects, with most hoping to update present skills, to learn new skills, and to get a job. There was a difference, however, in the degree to which completers and dropouts perceived that they are meeting their goals (except for one--develop confidence), i.e., more completers than dropouts perceived that they were achieving their goals. However, small sample sizes of several goals chosen preclude statistically sound conclusions.

Those individuals who perceived they were not achieving their goals were asked why. The reasons given for not achieving their goals in descending order of frequency were:

- Dropped out of the project
- Have not found a job
- Project was badly planned/executed
- Project did not update my skills
- Lacked proper background for project

TABLE 4.2. RATE OF PROJECT COMPLETION BY PARTICIPANT MAJOR

Major	Percent of Major Who Completed the Program	Total Number in Sample
Liberal Arts	100*	5
Computer Science	100*	1
Humanities	100*	6
Physics	90	20
Chemistry	88	185
Education	78	21
Mathematics	71	146
Engineering	63*	17
Other hard science	61	33
Social and Behavioral Sciences	61	70
Biology	55	167

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*Based on small numbers.

TABLE 4.3. EXPECTATIONS OF CAREER FACILITATION PROJECTS IN ORDER OF IMPORTANCE AND PERCEIVED ACHIEVEMENT OF EXPECTATION

Expectation	Number of Completers Citing	Percent of Completers Achieving	Number of Withdrawals Citing	Percent of Withdrawals Achieving
Update present skills	77	88.3	18	50.0
Learn new skills	33	78.8	8	50.0
Get a job	33	75.8	14	57.1
Help in career change	31	90.3	12	16.7
Get a better job	29	72.4	14	21.4
Get a job in degree-related field	29	69.0	10	10.0
Admission to graduate school	25	84.0	8	50.0
Experience and knowledge	20	90.0	2	50.0
Develop confidence	18	94.4	4	100.0
Exposure to new field	5	80.0	2	0.0
Get a challenging job	3	100.0	2	0.0

- Project too short
- Project prepared person for undergraduate school, not a job
- Left project to attend graduate school

The reasons given for not achieving the goals indicated that project participation was an integral component and a necessary step in accomplishing what the participants had set out to do.

Participant Groupings

A "constituency analysis" was performed to determine the different groupings of participant characteristics, and to determine the number of distinct participant groups. The analysis was based on the following variables; age, project status, highest degree attained prior to entering the program, number of years worked prior to entering the program, number of years worked in a degree-related job, family income, number of children under 6, number of children ages 6-12, number of children over 12, work status while attending the program, marital status, reasons for participation and problems associated with attendance. These variables yielded two factors and provided a basis for clustering participants.

The first factor or variable was amount of previous work experience. The items included in this factor were years worked prior to entering the Career Facilitation project, years worked in a degree-related position and age. The second factor was the availability and need for work. Items included in this factor were work status while attending the program, marital status, number of children between 6 and 12 and financial reasons for participation.

Three levels of these variables--high, medium, and low--formed eight clusters. If the current employment data is analyzed by participant cluster, all of the women in the clusters representing high and medium availability (irrespective of the level of experience) tended to be employed.* On the other hand, clusters representing low availability tended not to be employed. The number of individuals in each participant group is given in Table 4.4.

This finding seems to be logically inconsistent with the finding that motivation on entry did not predict later employment. The present analysis, based on demographic characteristics rather than self-reported perceptions, indicated otherwise. Although no definitive resolution of this discrepancy is suggested by the data, it seems possible that the expressed desire for educational and professional development is present whether or not a woman needs to or is able to work, and that this motivation is the overriding conscious concern of many of the participants.

Summary

In summary, a typical woman interested in participating in a Career Facilitation project had only a bachelor's degree, was middle class, married, in her mid-thirties, and had not been employed in the last ten years. She left her last job for family reasons and had been employed in a nonscience field because of an absence of science related jobs in her vicinity. She entered the Career Facilitation Project in order to develop her educational and professional potential, although she anticipated some problems in actualizing this potential in the workplace. Reentry women scientists, then, have much in common with other reentry women.

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*The exception was medium availability and high experience.

A comparison of project dropouts and completers showed that the dropouts were younger and had younger children, had lower family incomes, and were already employed. The dropouts reported withdrawing because of the intense demands on time incurred during project participation. Fewer of the dropouts than completers reported achieving the goals they had set for themselves.

TABLE 4.4. PARTICIPANT GROUPINGS

	Experience		
Need for employment	HIGH	MEDIUM	LOW
HIGH	11	23	52
MEDIUM	13	51	43
LOW	23	68	0

Neither the participant's reported motivation for project entry nor her perception of the problems of employment appeared to be correlated with obtaining employment at project termination. This suggests that project participation, rather than motivation for reentry, played an important role in determining the individual outcome.

However, an examination of the clusters of demographic characteristics of the participant showed that women with a high need and availability for work, as judged by income, age of children, and so on, were employed at project termination, while those with low availability or need for work were not. On the other hand, the amount of previous work experience did not appear to be related to employment status at project completion. These facts may be appropriately incorporated into selection procedures.

5. PARTICIPANT OUTCOMES

Evaluation, broadly defined, is a feedback system that provides a basis for learning from previous experience. Evaluation can provide information that allows a program to capitalize on its previous successes and avoid repeating its failures. Consequently, the purpose of evaluating the strategies employed by NSF was to incorporate the knowledge gained from previous or current projects into future programs so that more effective methods and procedures may be identified and utilized.

To generate the evaluative information, DRI assessed the strategies employed by the NSF Career Facilitation projects. Although the projects were similar in conception and purpose, each project was an entity in itself. Each project differed in design, subobjectives, discipline, duration, mode and intensity of instruction, and the number of participants. These differences among the projects, as envisioned in the original project proposal, are seen in Tables 5.1 and 5.2.*

The evaluation focused on determining those approaches that best accomplished the goals identified by each of the participating groups, rather than determining which projects were "successful" and which projects were not. In other words, the evaluation attempted to determine the approaches, rather than the projects, that were successful.

A broad picture of the effectiveness of many projects and strategies can produce more useful and relevant information in

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*Some of the projects have added additional components or emphasis not identified in the tables, although we know of no instance where components were deleted.

TABLE 5.1. PROJECT COMPONENTS

Project / Component	Max. Academic Prep/Retrain	Min. Academic Prep/Retrain	Job Internship	Substantial Research Proj.	Job Development	Job Placement Assistance	Vocational Information	Vocational Testing	Job Info/Referrals	Job Hunting Skills	Group Counseling	Personal Dev & Value Clarif.	Orientation Sessions	Child Care	Financial Assistance	Study Skills/Writing Course	Instruction a. self-paced	b. independent study	c. media study	d. tutorial assistance	Part-time	Full-time	Duration (weeks)	Grant Degree
American	X					X			X	min											X	X	26/14	**
UC Davis	X		X			X			X	aver	X		X	X							X		30	
Chestnut Hill	X					X			X	min			X								X		15	
Dayton	X		X		X	X	X		X	max	X	X	X			X	X			X		X	50	
George Mason University	X		X	X		X			X	min	X						X	X			X		36	
Lowell	X			X	X	X			X												X		50	
Notre Dame	X			X		X	X	X	X								X			X		X	4	
N.Y. Poly-technic	X								X	aver			X				X	X	X		X		44	
College of St. Catherine	X					X			X		X	X					X		X			X	15	
University of Texas--Austin	X			X		X			X	min			X									X	50	
Washington State--Pulman	X			X		X			X						X							X	45	X
Alcorn		X							X	min												X	6	
Chatam College	X		X	X		X			X	max	X	X	X			X		X		X		X	50	
CUNY	X			X		X			X	max	X	X	X								X		32*	
Cal. State Northridge	X		X		X	X			X	aver	X	X	X		X					X		X	50	
Mt. Holyoke		X							X	min												X	2	
Mt. Saint Mary's	X		X			X			X	min	X		X			X		X			X		50	
So. Illinois Edwardsville	X					X			X	min			X			X	X			X		X	32	
SUNY Stony Brook		X	X	X	X	X			X	min			X				X	X	X	X	X		36	
Univ.--Texas Arlington	X			X		X			X	min	X						X			X		X	26	

*Note that summer participants had much less.

**American Univ. ran two sessions, a part-time and a full-time.

TABLE 5.2. PROJECT OBJECTIVES

Project / Objectives	SHORT RANGE OBJECTIVES	Increasing Job Readiness	Increasing Applied Science Skills	Increasing Industry Responsibility to Women's Needs	Increasing Theoretical Skills	Increasing Number Entering Graduate School	Increasing Institutional Responsivity to Women's Needs	Increasing Number in Management Positions	INTERMEDIATE OBJECTIVES	Increasing the Number of Women Employed in Science-Related Areas	Increasing the Number of Women Completing Graduate School in Science-Related Areas	Increasing Opportunities for Advancement for Already Employed Women
American					X	X	X			X	X	
UC Davis		X	X							X		
Chestnut Hill					X					X	X	
Dayton		X	X	X			X			X		X
George Mason University					X		X			X		
Lowell					X	X	X				X	
Notre Dame		X			X					X		
N.Y. Polytechnic					X	X	X				X	
College of St. Catherine					X					X		
University of Texas--Austin		X	X		X		X			X	X	X
Washington State--Pulman		X	X		X	X	X			X	X	
Alcorn			X									X
Chatham College		X	X	X	X		X	X		X		X
CUNY		X	X		X	X	X	X		X	X	X
Cal. State Northridge		X	X	X			X			X		
Mt. Holyoke		X	X									X
Mt. Saint Mary's		X			X	X				X	X	
So. Illinois Edwardsville		X		X	X	X				X	X	
SUNY Stony Brook		X		X	X		X			X	X	
Univ. of Texas--Arlington		X	X		X	X	X			X	X	

designing or modifying a program than an in-depth look at a few projects. When a project is examined in depth, there is a tendency to concentrate on elements idiosyncratic to that project, such as the role of project personnel, which do not provide a basis for generalization and policy decisions; a range of alternatives for accomplishing similar goals is not generated; and generalizations which may hold true across many projects, such as the characteristics of sponsoring institutions or participants, are not produced. Information regarding the general effectiveness of several approaches and many projects as a function of participant outcome is analyzed in this chapter as well as Chapter 6.

This chapter describes the perceptual and behavioral outcomes of project participation and several process and outcome measures, such as success in recruiting and retaining participants, the number of completers employed, the number attending school, and the number seeking a job. It also describes the participants' views of the project components, of the benefits they derived from the projects, their willingness to contribute to project expenses, and their willingness to relocate to participate in the project. The chapter also briefly describes some institutional outcomes derived from program participation.

The assessment was based on an evaluation of the ten 1976 projects, the eleven 1977 projects, and the sample of 1976 projects that received continuation funding. The timing of the evaluation differed for each project; it evaluated completed 1976 projects, although the length of time since completion was not constant, and evaluated the 1977 projects while the project was being conducted, although the stage of project implementation was not constant. In an attempt to deal with the problem of timing, the chapter only contains information given by women who had completed the project and information given by those currently attending is not included. Since it was assumed that participants would be more satisfied with the project, and be more likely to be employed, the greater the interval since termination, the projects were organized in the analysis in order of the time since completion. Although the time since completion influenced the number of respondents included in the analysis, it did not appear to be directly related to other outcome measures. Outcome differences are very apparent in the differences in the data collected at different points in time for a single project. Specifically, outcome measures reported by project directors in summer of 1978 and the data collected by DRI in the fall of 1978 showed different outcomes, the latter substantially more positive. The increasingly positive outcome suggests an ever-increasing project payoff; it does not appear that the projects produced a spurt of activity that diminished rapidly.

Because much less data was available on the projects starting in 1977, and the participants' view of the projects was highly colored by the demands and intensity of participants, a process evaluation of these projects, describing project design and early implementation, is given in Appendix C.* The information obtained from the projects leads to the expectation that their outcomes will not differ substantially from those discussed in this chapter. Therefore, the experiences of these projects are included in the next chapter that describes the conditions necessary for project success.

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*Similar synopsis of the 1976 projects is provided in "An On-site Assessment of the Career Facilitation projects" by Conrad Katzenmeyer, published by NSF.

In collecting the data for the assessment, multiple sources were used. These sources included: project documents such as proposals and final reports, the internal formative and outcome evaluations conducted by many of the projects, the NSF-generated formal and informal evaluations of the projects, the survey of project participants, a survey of project directors, and a survey of other administrative personnel at the implementing institution.

Behavioral Measures

In order to determine the effectiveness of a project, some criteria must be made as a standard basis for judgment. If the characteristics of successful and unsuccessful projects are to be compared, a uniform outcome measure must be used. Educational programs may have a large number of goals, each reflected in a different outcome measure. The different outcome measures in turn may reflect different stages of project implementation. For example, participant recruitment and retention are short-term measures, participant satisfaction is an intermediate measure, while participant employment, school attendance, and achievement of goals are long-term measures. In addition, each outcome measure may reflect a variety of factors, some of which may be only tangentially related to project functioning. Consequently, it was thought that more could be learned from utilizing several different outcome measures which reflected the different aspects of project functioning. However, measurement of all of the diverse goals, project stages, and project factors was not possible. Therefore, the measures were arbitrarily chosen and were limited by the availability of baseline data on the participants prior to project inception.

Although determination of individual project success was not of primary interest to the evaluation, assessing individual project outcomes was a necessary intermediate step to isolating procedures and characteristics associated with success. In addition, individual project outcomes are important to project directors in assessing the strengths and weaknesses of their projects. The individual outcomes also serve to illustrate the diversity and variation among the projects. Consequently, the outcomes of individual projects, as well as an overall outcome of the program, are given for the following outcome measures.

Project recruitment. One early measure of project functioning is a project's success in recruitment. Those projects having a large number of inquiries and applicants reflect, in part, a project's success in disseminating information about the project to the appropriate target audience. The number of applicants may reflect the perceived desirability of the project, while a high ratio of applicants to participants enables efficient and appropriate participant selection procedures. Table 5.3 gives the total number of participants and applicants, as reported by the project directors. The table illustrates that some projects were much more successful in generating interest in the project than others. For example, the table shows that some projects accepted all of the applicants while others turned down many of the applicants. Overall, about half as many people were turned down as participated in the projects.

Survey response rate. Table 5.3 also gives the response rate to the evaluation survey for each project. The overall response rate varied from a high of 88 percent in some projects to a low of 45 percent. The response rate of project completers relative to the response rate of

TABLE 5.3. DESCRIPTION OF SURVEY SAMPLE

1976 PROJECTS

Institution	Participants	Applicants	Withdrawals	No Shows	Inquiries	Miscellaneous	Total
University of California, Davis							
Number surveyed	38	27	--	--	--	22	87
Number post office returns	0	4	--	--	--	0	4
Number completed	30	20				5	55
Percent completed	79	87	--	--		22	66
American University							
Number surveyed	26	3	7	--	--	--	36
Number post office returns	0	0	0	--	--	--	0
Number completed	17	3	3	--	--	--	23
Percent completed	65	100	43	--	--	--	64
University of Notre Dame							
Number surveyed	16	--	--	--	--	--	16
Number post office returns	0	--	--	--	--	--	0
Number completed	14	--	--	--	--	--	14
Percent completed	88	--	--	--	--	--	88
University of Lowell							
Number surveyed	9	10	2	--	--	--	21
Number post office returns	0	2	0	--	--	--	2
Number completed	7	5	2	--	--	--	14
Percent completed	78	62	100	--	--	--	74
College of St. Catherine							
Number surveyed	19	6	1	--	--	--	26
Number post office returns	0	0	0	--	--	--	0
Number completed	16	5	0	--	--	--	21
Percent completed	84	83	0	--	--	--	81
Polytechnic Institute of N.Y.							
Number surveyed	33	9	--	2	--	--	44
Number post office returns	2	2	--	0	--	--	4
Number completed	17	2	--	0	--	--	18
Percent completed	55	29	--	0	--	--	45
University of Dayton							
Number surveyed	27	36	4	--	--	--	67
Number post office returns	0	7	2	--	--	--	9
Number completed	23	18	2	--	--	--	43
Percent completed	85	62	100	--	--	--	74
Chestnut Hill College							
Number surveyed	30	25	--	--	--	--	55
Number post office returns	0	2	--	--	--	--	2
Number completed	25	19	--	--	--	--	44
Percent completed	83	83	--	--	--	--	83

TABLE 5.3 (cont.)

Institution	Participants	Applicants	Withdrawals	No Shows	Inquiries	Miscellaneous	Total
University of Texas, Austin							
Number surveyed	10	12	7	3	--	6	38
Number post office returns	0	1	2	0	--	1	4
Number completed	7	10	1	0	--	1	19
Percent completed	70	91	20	0	--	20	56
George Mason University							
Number surveyed	20	--	9	2	--	--	31
Number post office returns	0	--	1	1	--	--	2
Number completed	17	--	7	1	--	--	25
Percent completed	85	--	88	100	--	--	86
Washington State University							
Number surveyed	7	--	--	--	31	--	38
Number post office returns	0	--	--	--	3	--	3
Number completed	3	--	--	--	17	--	20
Percent completed	43	--	--	--	61	--	57
Total 1976 Programs							
Number surveyed	235	128	30	7	31	28	459
Number post office returns	2	18	5	1	3	1	30
Number completed	176	82	15	1	17	6	297
Percent completed	76	74	60	17	61	22	69

1977 PROGRAMS

Institution	Participants	Applicants	Withdrawals	No Shows	Inquiries	Miscellaneous	Total
California State, Northridge							
Number surveyed	26	25	8	--	--	15	74
Number post office returns	0	0	0	--	--	0	0
Number completed	19	14	7	--	--	10	50
Percent completed	73	56	88	--	--	67	68
Mount St. Mary's College							
Number surveyed	19	--	--	--	--	--	19
Number post office returns	0	--	--	--	--	--	0
Number completed	11	--	--	--	--	--	11
Percent completed	58	--	--	--	--	--	58
Southern Illinois University							
Number surveyed	16	--	6	--	203	5	230
Number post office returns	0	--	0	--	20	0	20
Number completed	10	--	4	--	81	3	98
Percent completed	62	--	67	--	44	60	47

TABLE 5.3 (cont.)

Institution	Participants	Applicants	Withdrawals	No Shows	Inquiries	Miscellaneous	Total
Mt. Holyoke College							
Number surveyed	40	--	--	--	--	2	42
Number post office returns	0	--	--	--	--	0	0
Number completed	32	--	--	--	--	2	34
Percent completed	80	--	--	--	--	100	81
Alcorn State University							
Number surveyed	7	--	1	--	--	2	10
Number post office returns	1	--	0	--	--	1	2
Number completed	3	--	0	--	--	1	4
Percent completed	50	--	0	--	--	50	50
CUNY, Graduate School							
Number surveyed	50	53	13	--	--	7	123
Number post office returns	0	2	1	--	--	1	4
Number completed	35	29	7	--	--	5	76
Percent completed	70	57	58	--	--	83	64
SUNY, Stonybrook							
Number surveyed	20	11	2	--	--	2	35
Number post office returns	0	0	0	--	--	0	0
Number completed	15	9	1	--	--	0	25
Percent completed	75	82	50	--	--	0	71
Chatham College							
Number surveyed	23	17	1	--	--	--	41
Number post office returns	0	1	0	--	--	--	1
Number completed	21	11	0	--	--	--	32
Percent completed	90	69	0	--	--	--	80
University of Houston							
Number surveyed	17	--	--	--	--	--	17
Number post office returns	0	--	--	--	--	--	0
Number completed	9	--	--	--	--	--	9
Percent completed	53	--	--	--	--	--	53
University of Texas, Arlington							
Number surveyed	39	28	3	--	--	22	92
Number post office returns	1	1	0	--	--	0	2
Number completed	32	13	1	--	--	10	56
Percent completed	84	48	33	--	--	46	62
Total 1977 Programs							
Number surveyed	257	134	34	--	203	55	683
Number post office returns	2	4	1	--	20	2	29
Number completed	187	76	20	--	81	31	395
Percent completed	73	58	61	--	44	59	60

project applicants is also given in the table. Although it is impossible to determine the differences between those individuals choosing to complete the survey and those choosing not to, systematic differences between these two groups frequently occur, and it may be assumed that project completers provided more positive evaluation than the dropouts. In any case, a more complete picture is given of those projects having a higher response rate and an equal percentage of completers and dropouts, i.e., the findings for that project are likely more valid.

Attrition rate. Table 5.4 gives the project attrition rates as reported by the project directors. Attrition may reflect at least three elements of project functioning: (1) utilization of appropriate selection procedures, (2) an accurate description of the project to potential participants, and (3) dissatisfaction with the project. The majority of the dropouts reported withdrawing because of the demands the project made on their time. It seems reasonable to conclude that the attrition rate was largely due to inadequate counseling of potential participants regarding the demanding nature of the projects.

Employment. Table 5.4 shows that about 65 percent of the project completers are employed either full- or part-time as reported by survey respondents but only 36 percent as reported by the project directors. In every case, the participants indicated a higher rate of employment than indicated by the project directors. Most of these differences may be accounted for by the difference in the times the data was collected, i.e., the participants were surveyed at a later date. The later time of data collection provided an additional period for the participants to obtain a job. The differences may also be attributable to a tendency for the more successful participants to complete the survey.

TABLE 5.4. BEHAVIORAL OUTCOME OF COMPLETED PROJECTS

	Davis*	American	Notre Dame	Lowell	Polytechnic	Dayton*	Chestnut Hill	Texas-Austin*	George Mason*	Washington St.	Alcorn	S. Illinois	Holyoke	Texas-Arlington	Total
Total number who completed the project*	28	26	16	9	19	26	30	11	20	7	7	16	39	26	281
Number responding who completed project	24	17	13	5	10	21	28	7	17	2	2	10	31	18	210
Dropout rate*	30	28	0	18	44	13	3	33	31	45	30	37	2	40	24
Percent employed either full- or part-time†	79	65	77	40	75	95	35	86	53	100	50	50	71	50	65
Percent employed either full- or part-time*	42	32	56	27	23	83	10	73	37	18	14	10	2	9	36
Percent employed either full- or part-time (only)	75	35	35	20	33	52	31	57	47	50	0	0	33	0	43
Percent with job less than one year	58	53	54	20	40	95	19	86	41	100	0	30	26	33	69
Percent employed as CFP major factor	67	33	33	0	0	100	25	100	62	100	0	0	14	33	52
Percent actively seeking a job	17	13	6	9	0	0	41	5	6	0	0	15	3	27	20
Percent actively seeking a job*	8	23	15	23	10	5	27	0	35	0	0	30	23	0	16
Percent participants attending school (only)	5	0	15	20	20	0	4	11	6	0	0	20	16	0	10
Percent attending school*	5	25	43	33	14	3	0	55	3	36	0	31	15	6	19
Total working and/or attending school	84	65	92	60	95	95	39	97	59	100	50	70	87	50	75

*As reported by project directors. If not asterisked, the percentage reflects the respondents to the survey.

†Many women were both employed and attending school.

In order to estimate the impact of the project on the participants' employment status, the responses to two survey items were used as a check. First, since some of the participants were employed prior to and during project participation, the length of present employment was obtained. It was assumed that most of the participants would have worked less than a year in their current job if project participation was a prime factor in obtaining the job. Specifically, it was assumed that few of the women would be upgraded to science-related positions within their old jobs (see notes accompanying chart).

The table shows that almost 70 percent of the participants had obtained their job within the past year. Only 30 percent who were employed had been employed in the present job prior to project participation.

Secondly, the women were asked the extent that project participation was a major factor in obtaining their current employment. Over half of those employed responded that the project was largely responsible for their current position. The responses to this item are probably the best indicator of individual project impact and show the greatest variation among projects. A minimal percentage estimate of employment directly resulting from project participation is between 35 and 45 percent.

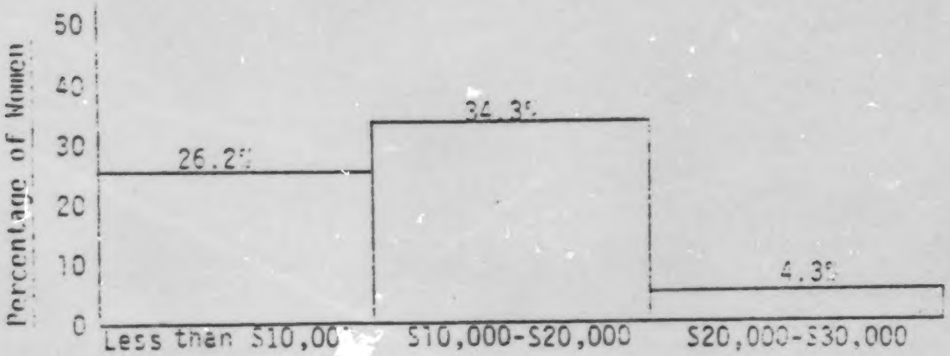
The sector of the current employment and current income derived from that employment were both project completers and dropouts is given in Table 5.5 and Figure 5.1. The tables show that many of the participants are employed in private industry, and a surprising number are self-employed. The table also shows that the number of participants including graduate teaching or research assistantships as employment is quite small.

TABLE 5.5. SECTOR OF CURRENT EMPLOYMENT

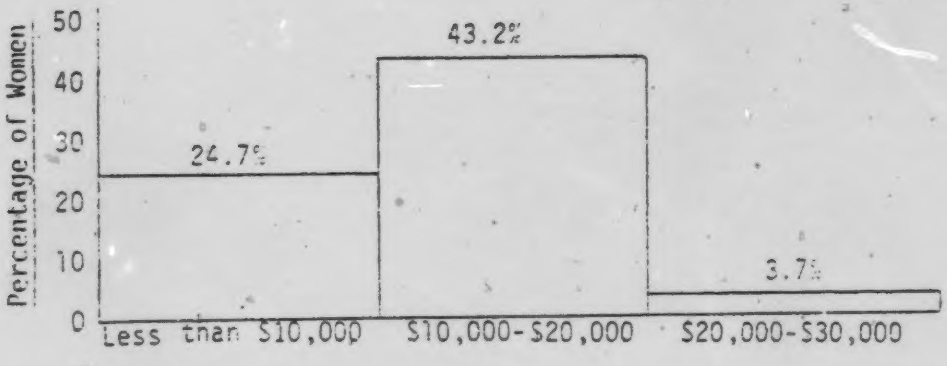
Current Employer	Percentage of Employed Completers	Percentage of Employed Dropouts
Federal Government	6.2	1.2
State Government	4.3	2.5
Local Government	7.6	17.3
Industry	31.9	38.3
Self	12.4	6.2
College or University	3.3	2.5
Other	33.0	27.2

15

Figure 5.1. Income from Current Job



Completers



Withdrawals

Analysis of the types of employment included in the other category revealed many jobs (or second jobs) in medical facilities, nonprofit or service agencies, and religious organizations.

Figure 5.1 shows an overall mean annual income for completers to be between 10,000 and 20,000 annually. Given the modest per participant costs in many of the projects, it appears that the investment by the federal government would be rapidly repaid by the additional tax paid on the income.

Job seeking. The project completers were asked whether they were presently seeking a job and in what activities they engaged in an attempt to obtain one. The project directors were also asked to estimate the number of project completers who were actively seeking employment. As indicated in Table 5.4, there is a general agreement between the two sets of figures. Both sets of figures suggest that approximately 18 percent of the project completers are actively seeking a job.

School attendance. The percentage of project completers who were attending school, as indicated by both the project directors and the survey respondents, is also given in Table 5.4. Although the overall percentage is higher as reported by the project directors, this discrepancy may be fostered by project directors including the number of participants both employed and attending school.

From the estimate of those attending school, and the estimate of those employed and attending school, it can be seen that about one-third of the project completers report being enrolled in school; unemployed women account for about 10 percent, while employed women account for 22 percent.

Differences between dropouts and completers. Another method of assessing the impact of the projects is to compare the current status or differential activities of completers and dropouts. An analysis of these activities showed that there was no significant difference between the percentage of completers and the percentage of the dropouts who were currently working or who were currently enrolled in school. However, significantly more of the dropouts were currently working full-time ($p < .05$), and had been in their current job significantly longer ($p < .05$). This finding reflects the greater percentage of dropouts working while attending the project and remaining in that job after withdrawal from the project. The results also suggest that more completers obtained their job as a result of project participation.

Perceptual Measures

Knowledge gain. One of the stated goals of the projects was to increase the educational credentials of the participants to that expected of a current graduate. Some of the projects had a criterion measure for this goal, such as exams, while others did not. Few, however, had any baseline measures of level of knowledge on project entry. It was impossible for the evaluation team, whose efforts were initiated midway through the first projects, to directly assess knowledge gain or to determine the level of knowledge at project termination. However, the level of knowledge may be inferred from the rate of employment and graduate school attendance. Specifically, the knowledge of the participants must have been raised to that of a current graduate if the participants were able to successfully compete for either graduate school admission or for employment.

Project rating. Survey respondents were asked to rate certain elements of their project. Five of the elements pertained to the curriculum and staff. These were rating the project director and the project staff, the curriculum content, the curriculum presentation, and the curriculum organization. The remaining elements were the support components, i.e., career counseling, and job placement services. The rating on each of these elements for each project is given in Table 5.6, as well as the overall mean for all of the elements for both the 1976 and 1977 projects. It should be noted that the mean rating given by the completers was higher than that given by the dropouts; that project completers were more satisfied with project offerings than the dropouts.

TABLE 5.6. RATINGS OF PROJECT COMPONENTS BY COMPLETERS

SCHOOL	PROJECT DIRECTOR	PROJECT STAFF	CURRICULUM CONTENT	CURRICULUM PRESENTATION	CURRICULUM ORGANIZATION	CAREER COUNSELING	JOB PLACEMENT SERVICES
Davis	1.8	2.0	2.0	2.2	2.5	2.7	2.7
American	1.6	1.5	1.8	1.8	1.9	2.8	2.7
Notre Dame	3.3	2.3	2.4	3.0	3.4	--	2.9
Lowell	1.4	1.4	1.8	2.0	2.0	2.2	--
Poly Technic	1.7	1.6	1.9	1.9	2.3	--	--
Dayton	2.2	2.0	2.4	2.6	2.5	2.4	2.2
Chestnut Hill	1.1	1.2	1.5	1.5	1.4	1.8	2.0
Austin	1.1	1.9	2.3	2.3	2.6	--	--
George Mason	2.0	2.4	2.6	2.7	2.8	2.4	2.8
Washington State Univ.	2.0	1.7	2.7	2.3	3.0	2.3	--
S.I.U.	2.8	2.6	2.8	2.4	2.9	--	--
Mount Holyoke	1.2	1.4	1.4	1.6	1.8	1.7	--
Alcorn	1.0	2.0	1.7	2.0	2.0	--	--
Texas - Arlington	1.7	1.8	2.3	2.1	2.4	2.4	2.6
Mean of 1976 & 1977 Projects	1.8	1.9	2.1	2.2	2.5	2.6	2.9

1=excellent
2=fair
3=poor
4=not applicable

The table highlights some interesting facts. Project directors and staff received the highest overall rating across projects, underscoring the observation made by the evaluation team that the project directors were capable, dedicated leaders and administrators. Many of these project directors donated time to the project far in excess of either financial or professional rewards.

The high rating of project personnel was followed closely by ratings of the course content. The satisfaction with educational experience is not surprising, it was the primary reason for project participation. In addition, the majority of the staff were science educators, and providing an educational experience coincided with their interest and expertise. The lower overall rating of course organization reflects the experimental nature of the projects and the fact that the project represented the first presentation of the material.

The biggest area of dissatisfaction among participants was with support services: the career counseling, and the job placement services. This appeared to be true even for those projects that emphasized these services. Although no interpretation of this fact can be definitive, it may reflect the lack of experience of the project staff with these activities and the lack of preparation for these activities on the part of the participants.

By far the most surprising of the findings shown in the table is the fact that satisfaction of the participants was not closely related to the derived benefits. Better indicators of satisfaction may be the participants' initial expectations and level of project difficulty. It seemed that where expectations were raised very high, or the project was very intense, the participants were less often satisfied. This observation suggests several interpretations. It is likely that project directors may have oversold their projects. They promised the moon without warning the difficulty of obtaining it. Combined with this overselling, adequate information and counseling were often not provided to the participants regarding the difficulty and demands of the project. Also, for many of the participants, the project "changed their life," and some were not ready to have it changed. The lack of correlation between derived project benefits and participant satisfaction has been noted in other educational studies that have also found that participant satisfaction is related to the absence of student stress, not with knowledge gain or successful outcome.

The comments given at the end of the questionnaire were also used as an indication of overall satisfaction. Generally, participants were pleased with the project, although this varied widely among and within projects. Participants were enthusiastic about the experience even though, for many, it was demanding and problematic.

Many participants reported that an additional project benefit was personal enrichment, both from the broadening of their horizons and from the support and increased confidence derived from the project staff and from other participants. Many participants commented that the group experience was a major strength of the project, especially in a project where the participants lived together in the dorms.

Overall, both the participants and the dropouts recommended the continuation of some type of program for reentry women. Most of the participants appreciated their experience and were grateful for the opportunity to participate in the project irrespective of the outcome on their personal lives.

Achievement of goals. As discussed in the last chapter on the participants, each participant was asked to indicate her goals upon entering the project. She was also asked whether or not she was achieving those goals. Although this question may reflect individual achievement independent of project participation, the fact that more completers than dropouts felt they were achieving their goals indicates that the item reflects project success at least to some degree. It may also indicate the appropriateness of the match between the projects and the individual goals and, therefore, appropriate selection procedures. The percentage of completers who responded to the survey who felt they were achieving their goals is illustrated in Table 5.7. This table shows that 65 percent of the completers felt they were achieving their goals.

Willingness to contribute to project expenses. Another indicator of satisfaction is if the participant is willing to take out a loan or pay tuition for the project. There was no significant difference in the willingness of completers and dropouts to either take out a loan or pay tuition; approximately 35 percent were willing to pay tuition and 23 percent were willing to take out a loan. There was also no difference in the willingness between completers who had obtained a job and those who had not.

TABLE 5.7. PERCEPTUAL OUTCOME MEASURES

Participant Satisfaction

	Davis	American	Notre Dame	Lowell	St. Catherine	Polytechnic	Dayton	Chestnut Hill	Texas, Austin	George Mason	Washington St.	Alcorn	S. Illinois	Holyoke	Texas, Arlington	Mean Percent
Percent achieving goals	88	71	69	40	75	60	100	91	100	76	50	100	40	90	50	65
Percent willing to pay tuition	46	41	0	60	0	20	19	69	86	12	50	0	20	33	44	60
Percent willing to take out a loan	46	36	7	0	0	0	19	23	57	24	50	50	0	9	39	32
Willing to relocate for participation	46	0	70	0	0	20	77	0	43	12	100	50	20	55	28	33

The reasons given for not being willing to pay tuition were, in descending order of frequency:

- Couldn't afford it
- Not worth it
- Would have opted for a regular degree program
- Family would object to expenditure

The reasons given for an individual not wanting to take out a loan were, in descending order of frequency:

- Had money to pay for it
- Couldn't afford it
- Not worth it
- Owe to much money already
- Don't want any debts
- Family would object to expenditure
- Would'nt have known the value of the program

The unwillingness to contribute to project costs was also related to the absence of a job guarantee and to the lack of opportunity to earn a degree in the program--either a second B.A. or a Master's degree. Several participants commented that without a degree, employers were dubious of the value of their work, especially employers unfamiliar with the program. Participants commented that if they had had to pay tuition, they would have expected a degree, or would have enrolled in a regular degree-granting program.

Of course, this measure of willingness is highly compounded with financial ability and prior knowledge about the value of the project at the time of enrollment, e.g., the projects had no track record of results. Finally, this question may indicate the unwillingness of many women to use family resources for what they may consider to be individual pursuits.

Willingness to relocate. Another indicator of the subjective value of the project is an individual's willingness to relocate to participate in the project. Although this measure is confounded by the availability of alternative family care, values, and current employment, those who value the project would be more likely to relocate to attend. The extreme variation by school in willingness to relocate at least indicates differences in project participants, if not the value of project participation. In addition, fewer project dropouts were willing to relocate (10 percent vs. 30 percent), although more dropouts were already employed and would sacrifice more than unemployed women.

Institutional Outcomes*

Many of the project directors reported substantial positive institutional outcomes. The major reported impact was a sensitization to the needs and potential of the population of reentry women. Most project directors reported that their faculties were extremely impressed with the motivation and dedication of these women and expressed interest in working with them further. Other institutional benefits included the opportunity for the faculty and the administration to see so many highly motivated women, some of whom are continuing their studies beyond the project and could be recruited to the university.

A few projects reported plans to develop similar programs in other fields; others simply noted beneficial effects of increased awareness of this population as a potential for institutional expansion.

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*The original evaluation proposal included industry in this group; however, the project directors requested that the evaluation team not interview personnel from the industries they had worked with.

Some projects made specific institutional changes as a result of the project experience. For example, Dayton University changed its requirements for a Bachelor's degree and instituted a new admission procedure for its Late Entry program.

An additional benefit seen by these institutions was the stimulation of faculty to explore innovative methods of instruction for the nontraditional student, as well as the opportunity for both the faculty and students to interact in a more relaxed and less competitive atmosphere.

Summary

The analysis indicated that about 75 percent of the completers have found jobs or entered graduate school, and most of the participants indicated that the employment was a direct result of project participation. Another 20 percent reported actively looking for a job. Most participants expressed satisfaction with the project and rated the project staff and curriculum highly. It appears that the projects offered a good opportunity to update science skills. The needs of this special population impacted every area of project implementation, and the lack of expertise with and knowledge of reentry women accounted for many of the problems most projects faced.

6. THE NECESSARY CONDITIONS FOR PROJECT SUCCESS

In this section, the elements identified as critical for a successful project are presented to assist in the design and implementation of future programs. Some of the necessary elements were derived from statistical analysis of the survey data, while others were identified from subjective comparisons of successful and unsuccessful projects.

Necessary Conditions

The Career Facilitation projects may be characterized in two ways. First, the project may be characterized as focusing on updating existing skills or retraining in new skill areas. Five schools retrained participants, 13 projects updated skills, while two did both. Secondly, each project may be characterized in terms of short-range objectives and intermediate-range objectives as illustrated in Table 5.2 and project components, Table 5.1.

A canonical correlation of project components and objectives showed that when participant employment was used as the outcome measure, several characteristics of successful projects were identified. First, both the employment rate and the completion rate were significantly higher for the projects oriented toward retraining than for the projects oriented toward updating skills ($p < .05$). Further, the engineering and computer science project participants had higher employment rates than those in chemistry or mixed field focus projects ($p < .05$).

Projects which had internships had a significantly higher employment rate than those that did not ($p < .05$). Internships provided a valuable practicum experience and were a source of financial assistance to the participants.* Projects used them at varying times and for varying durations. One project had the participants in class in the morning and at internships in the afternoon. Others used blocks of two to four months for internships, either on a full- or part-time basis, and most projects scheduled internships late in the project. No project reported difficulty in obtaining these industrial internships. On the other hand, the two computer science projects used individual research projects as a practicum component. In an applied field, with a high demand for graduates, a practicum may easily substitute for an internship.

To determine if project objectives could account for differences in employment rates, the projects were classified by the number of employment-related objectives stated in the proposal. The analysis showed that the number of job-oriented objectives significantly predicted the employment rate of the project participants ($p < .05$). Finally, the analysis showed that longer project duration was significantly correlated with higher employment rate ($p < .05$). All of these components, highly correlated with employment, tended to occur together. Since project that were focused on retraining were most often in engineering, had internships, and a longer training period, the contribution of each of these factors in producing a high employment rate cannot be isolated.

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*Some of the engineering projects reported that the participants received about $1,000 per month for their internships

In addition to a focus on engineering and computer science and the inclusion of internships, a clear project design,* including a theoretical framework, specific expected outcomes and measures, and a detailed evaluation plan, is another necessary condition for a successful project. A well designed project can be more easily implemented, evaluated, and is more useful to NSF. A well conceived, sound design provides the basis for smooth implementation and insures that adequate forethought and planning is done prior to project inception.

A strong counseling component is also needed for a successful project. For the reason identified in Chapter 3, group and individual counseling needs will be strong. These should be planned for with the help of a staff member experienced in working with both mature reentry women and job placement. Nontechnical assistance to the participants will need to range from the practical (resume preparation, interviewing skills), to the supportive (role models, discussion of family conflicts), to behavior modification (development of a positive self-image, career awareness, and goal setting). Another important need for the participants is the development of a professional identify.

It is important for institutions to have the necessary capabilities for responding to the needs of this population, and project staff should have expertise and professional experience in educational programming/counseling for this population. If not, some unit of the institution having this capability should be used for consultation, e.g., personnel from a reentry program elsewhere in the institution may be used. Most importantly, project directors should anticipate the special problems and needs of the participants.

(p. 104)

*Given the responses of the science educators, the "experimental" nature of the program should be continued, e.g., one of the few elements enhancing the professional benefits of project direction accrued from its experimental nature.

Despite the recommendation for a strong counseling component, it should be remembered that the participants did not always receive the counseling activities with enthusiasm. Many resented a "condescending" attitude on the part of project counselors who led values clarification workshops. The most specific and practical of the counseling activities appeared to be the ones best received, i.e., practical interviewing skills, resume writing, etc, Nevertheless, the attention to the nontechnical needs of reentry women should be planned for and implemented with feedback from the participants.

A clearly formulated management plan, with definite guidelines for delegation of responsibilities, is also needed for project success. The project director should not try to be all things to all people, i.e., recruiter and selector, administrator, teacher, counselor, evaluator, job placement coordinator. Most projects found it useful to have the majority of the teaching done by personnel other than the project director, while a part-time counselor designed and implemented the nontechnical components. Many projects found a part-time secretary/administrative aide essential.

Clearly stated goals of knowledge gain should be developed. Although problematic in a few projects, directors should focus on the academic component in terms of expected knowledge gain, instead of providing a jumble of quick review. Too often with the "smorgasboard approach," the women appear to end up less confident and more confused. Courses should stress problem solving, an area where reentry women are traditionally weak. A week of "review of review" is also helpful in order that the participants can see the whole picture of what they have learned.

A well researched job market projection is necessary in order that the appropriate disciplines, internships, and employment fields may be identified. The project director should not rely on the national estimates of the under-utilization of women scientists to demonstrate the need nor on national figures to demonstrate job opportunities. Each project plan should contain an analysis of the local job market for graduates in a particular field derived from local industry.* Data on local unemployment in the scientific fields, growth, and turnover in the major scientific industries, and the degree and experience level required by potential employers should be included.

Another important factor in a successful project is adequate lead time for recruitment, selection, and course development. At least six months should be allowed for publicity and recruitment in a first-time project. Most project directors underestimated the time and energy needed for this phase of the project. Three elements influence the need for this lead time: (1) Since the nature of the project is different from the academic norm, a market needs to be identified and promotion done, such as when a new product is introduced on the commercial market. (2) Many of the women need time to reorganize their lives so that they can participate. Often they need time to make alternative family arrangements. Assisting the women in making these arrangements and deciding whether the project is right for them is also necessary. (3) Selection of the participants proved to be much more difficult and time consuming than most of the project directors anticipated.

Most of the 1976 projects were underbudgeted, it was evidenced by the increase requested in the refunding proposals. Especially underbudgeted were the areas of counseling and project administration.

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*Required in proposal.

Many of the projects underestimated the need for secretarial/administrative time which is usually required for highly individualized projects. It was almost impossible to accurately generate per participant costs given the differences in the expected and actual number of participants, the differences in start-up costs, unreimbursed faculty time, cost-sharing and overhead rates, and course offerings. Consequently, no "average" cost per participant can be given. However, judging from the range of costs by almost any method of calculation (from about $374 to about $8,800 per participant by one method of calculation), cost per participant was not related to project success. Specifically, a full range of "per participant" costs was covered within the most successful projects, as well as within the least successful projects.

Promising Strategies

It was difficult to obtain conclusive and accurate information on some aspects of project design and implementation, either because the projects themselves did not keep data, or the topic was amenable to quantative analysis. However, because these are areas of concern to every potential project, some comment is made on certain of these areas in the following paragraphs, i.e., it is a synthesis of important aspects of project components and implementation strategies.

Strategies for participant recruitment varied in design and success. Some projects found alumnae mailings to be useless; others found them to be effective, especially in small women's colleges. Larger coed institutions did not have as much success with this approach and had better luck with print mail. The best strategy may be to consult past project directors from the most similar institutions. A list of the percentage of completers, dropouts, and current attendees recruited by each method is given in Table 6.1.

One recruiting source for several projects were the male scientists' wives. Fifty percent of American university's participants were married to men employed in the sciences. This suggests that informing male scientists could be a useful strategy. An area where women are traditionally employed in the sciences is in teaching, and this has proved to be a large group of potential participants for some projects. One method of participant recruitment which has proved not useful is contacting employers. Apparently, employers are not interested in providing participants for fear the women will not return to the company upon completion of the project.

Effective participant selection was problematic for many project directors. A list of indices that did not serve well as predictors of achievement can be given, including past grades (except math) and letters of recommendation. The use of a professional experienced with reentry women in both the design of the application form and the evaluation of applicants may be helpful. Many projects relied upon personal interviews for the screening of applicants. This task takes time, and may not be necessary for all potential participants, but only for the borderline cases.

The absence of a mathematical background, especially for the computer science projects, was reported to be a good predictor of participants who would have trouble. An inadequate mathematics background often meant difficulty with fast technical and quantitative review and learning which resulted in project attrition.

TABLE 6.1. METHOD OF RECRUITING

	Percent Completed	Dropouts	Current Attendees
Friend	21	20	25
Alumni News	12	12	8
Newspaper Article	28	27	30
Newspaper Ad	15	14	16
Radio	1	3	0
Magazine	3	4	1
School Bulletin Board	3	5	4
Direct Contact	16	16	19
Other	1	3	1

One method used for publicity, recruitment and selection was the introductory conference. Such a conference may be especially helpful in establishing motivation and a realistic expectation on the part of potential participants, as well as providing counseling regarding the problems of reentering, clarifying goals and values, and increasing awareness of available support systems. At least one of the projects reported a great deal of success in including the particpants' families in these initial activities.

One important aspect to be considered in project implementation is the heterogeneity of the participants selected. While the evaluation staff disagreed among themselves on this issue, participants felt the heterogeneity made for a less satisfactory project. Certainly participant heterogeneity presented logistical and instructional problems for the project directors, e.g., it was difficult to meet the needs presented by the differing backgrounds. On the other hand, participant heterogeneity opened the opportunity to greater numbers of qualified and talented women and may, in the long run, strengthen the project by increasing the diversity among participants.

A problem-solving approach to updating science skills appears to be the best instructional emphasis. Because many of the projects are so intense, absolute knowledge gain may be short-lived. The participants needed confidence in their ability to work at a subject which they had left for some time. To establish this confidence, the best approach appeared to be teaching the participants to use the tools of the field--both its instruments and theory. In addition, most project directors found that some review and remedial work was necessary during the first phases of the project.

Several projects used self-paced teaching materials. One interesting example which can demonstrate the pros and cons of this approach is the Dayton project. One half of the participants (chemical engineering) received lectures in a traditional format, while the other half (electrical engineering) used self-paced techniques. The chemical students taught by lecture showed high anxiety throughout the project. The regular testing and homework assignments increased fears of failure and test anxiety, instead of reinforcing success and lessening anxiety. The only dropouts in the project occurred in this group. On the other hand, it was this group of students who felt they had really accomplished something at the end of the project.

The students using self-paced methods seemed to have lower stress and anxiety during the project. Several students who needed constant attention and reassurance were identified through the self-paced course and received that assistance. Because of the less structured approach, less additional counseling was needed in the beginning. However, these students finished the project with a lower overall level of confidence in their accomplishments than students taught by lectures.

One hazard of self-paced instructional techniques is that some participants, more accustomed to the traditional lecture format, may resist these "new-fangled" techniques. The resistance may be partially attributed to faculty insensitivity to the anxiety level of the participants. The faculty may have sat-back and expected the participants to approach them with problems. If the self-paced technique is to be effective, the instructor may need to take a more formal and active role than with regular undergraduates, and personally monitor the students' progress and meet collectively with them every class period for a few minutes of discussion/explanation. This mix of personal attention and self-paced instruction may be complementary and used concurrently.

Most projects developed special courses for the participants and separated the participants from the regular students. Several major benefits can be attributed to this approach.

First, the participants as a group and as individuals can be more easily monitored and problems more easily spotted and corrected. Second, the participants usually formed a solid support network for each other to handle both academic and personal adjustment problems. This was especially important in the more intense projects and was the factor most often sighted by project directors as helpful in reducing attrition.

However, those projects integrating their participants in regular undergraduate or graduate courses stressed the confidence building aspect of this integration. The participants had more faith in an evaluation (grade) for them in comparison with "the kids" than in comparison with each other. One project director who used both integrated and segregated classrooms, commented that she had the "best of both worlds" in her project. Although total integration may not be advisable because separate classes are effective in anxiety reduction, some mix of integrated and separated classes may produce the best long-range results.

Most participants favored a part-time schedule over a full-time one. Many participants needed to support themselves and their families while participating in the project. Thus, many of the long duration full-time projects posed financial hardships on the participants. Several participants commented that providing tuition was not enough and financial support was also needed.* They further commented that the project design showed little concern for the problems of all ready working women.

Although part-time scheduling allows participants to continue in their current job, a major reason for attrition across projects was the woman who tried to work part-time, study part-time, and be a mother part-time. Similarly, the full-time approach had the benefit of full immersion and prepared the participants for a full-time commitment that may later be required.

Surprisingly, the project directors who reported child care problems were those that had evening sessions. Child care seemed to be easier to obtain in the daytime when school-age children were in school.

The trend in the projects was to grant some official recognition of participants' completion. For most projects, credit was

(p. 113)

*NSF responded to this need by providing some allowance for financial support of the participants to the project directors. Individual projects have also attempted to secure outside support for participants. For example, New York Polytechnic Institute has secured several commitments from private corporations to sponsor participants by providing financial support.

granted on a graduate level. One project awarded the participants a second B.A. degree upon successful completion of project course work, one project prepared the students for the Engineers In-Training Exam, an entry level test for engineers, and most projects granted certificates stating the number of course work hours completed. There are several compelling reasons to grant formal institutional credit for project completion. First, the granting of institutional credit helps to integrate the project into the college or university. Second, credit allowed the participants to compete on an up-to-date basis with recent graduates. Finally, many participants expressed anxiety about the potential results of their efforts. Credit or a degree upon project completion is desirable.

Two projects offered technical writing courses and participants responded enthusiastically to the courses. The courses were also well received by potential employers. Other projects might experiment with this type of technical writing course.

About half of the projects used an industrial advisory board to review their project plans and advise them regarding curriculum. The industrial advisory board also helped to provide internships, factory/plant tours, personnel to lecture on special topics, etc. The presence of an industrial advisory board did not appear to impact project outcome but only to reflect the personal style of the project director. In some projects an industrial advisory board may prove to be a useful tool, while others may not want or need this formal structure.

Projects reported mixed results with industrial representatives, some were good and some were recruiters in thin disguise. Advance screening of outside personnel, either through interview or presentation to staff, seems advisable.

The NSF evaluation of the early projects concluded that the "location of projects is critical if they are to obtain adequate numbers of participants." The report goes on to say:

> Location of projects is clearly a critical variable. To be successful, the project must be located in an area where there is a substantial number of women with science training, and a large number of potential employers. There were exceptions; some women traveled to projects from a great distance. However, most participants are going to be from the immediate area of the project, and it is essential that the area be able to provide the necessary participants if the projects are to be successful. The implication is that most of the Career Facilitation projects should be located in urban areas. (Katzenmeyer 1978)

However, on the basis of an additional year of evidence, location does not adequately explain all of the variance in an applicant response. For example, one 1976 project had trouble with participant recruitment, while a 1977 project in the same location had the most applicants of any project. Consequently, although the condition stated in the NSF report that an urban location with potential participants and employers is certainly useful, the location does not insure success in recruiting applicants.

The status of the project director did not appear to be important in project success or its institutionalization. Rather, the important variable appeares to be an institutional or departmental commitment to serving the needs of reentry women. Of course, if the project director was a dean, this commitment was more explicit. But the status of the project director was not necessarily an indicator of institutional/departmental commitment.

When the commitment to reentry women existed and the project was successful, the status of the project director increased. If the project director was a woman, one project outcome was to directly improve at least one woman's visibility and credibility in the scientific and academic community.

If the project director is an established, high status member of the institution, he/she can often avoid or alleviate bureaucratic bottlenecks and expedite exemptions and special waivers needed for these projects. If a high status member of the institution has some level of participation, many of these advantages can be realized in spite of a low status project director.

The best combination of departmental sponsorship may be represented by a joint arrangement between the science department and the continuing education center. The science department provided credibility to the project, both to the participants and the employers, while the continuing education center provided many of the support services, such as counseling and job placement necessary for the women. In addition to joint sponsorship between the science department and the continuing education center, many other departmental arrangements might be explored and may be highly successful.

Although none of the projects utilized a campus based women's center, experimental projects using women's centers and science departments is recommended (cf. Chapter 12). The women's centers contacted by the evaluation effort expressed considerable interest in meeting the needs of reentry women scientists although they felt they had little resources to do so. However, many participants do not consider themselves as "feminists", and may be offended by the general approach and philosophy of the women's centers. If women's centers are to be incorporated into the program design, the impact of their public "image" should be watched closely.

Project Institutionalization

All of the projects which applied for continuation funding were required to submit plans for project institutionalization. The plans varied from project to project, but all plans addressed two issues: participant support and project support/administration.

Project support and administration took two directions, either continued separation or integration into the regular academic programs. Several projects plan to continue their programs as separate programs within the university specifically for this population. Usually, tuition would be charged and, at the minimum, credit granted. One estimate of the tuition charge was $1,000 per student for the program. The faculty would be supported either by the institution or outside funding would be sought. Dayton University plans to integrate the project into their other late entry programs. Chestnut Hill plans to continue the project under the supervision of the Continuing Education Center. Dayton and several other projects plan to secure industrial sponsorship for the projects.

The other projects plan to integrate the project into their regular science curricula. American University plans to list the courses in their catalogue, Austin intends to set up a program to retrain students of all ages in computing, and New York Polytechnic plans to videotape the short courses so that the entire course is available on an individual basis for any student. These projects plan to have the administrative and faculty costs paid for by the university and charge tuition to the participants. In the projects taking the integration approach, the participants will be either entirely self-paced or integrated into the mainstream of the university.

The approaches are diverse to provide for participant support. Most projects recognize the need for this support based on their 1976-78 experience. Many projects are expanding their internship programs to provide sufficient income for the participants, and others will offer graduate assistantships in the department. New York Polytechnic has already had some success in acquiring industrial support, as has Dayton, and Mount Holyoke. Other projects plan to solicit special fellowships or special grants to cover tuition and living expenses. Finally, all projects reported investigating the possibility of providing low interest loans.

The panel (cf. Chapter 11) expressed skepticism about these plans. First, they questioned if any projects would actually be institutionalized and, if so, in what form(s)? A major concern to the panel was the possibility that the institutionalized form would no longer address the unique needs of this group, such as the need for peer support. A review of the projects and panel comments suggested that the probability of institutionalization is increased by a match of project goals with institutional/departmental goals and commitments.

Summary

Several project elements which frequently occurred together were statistically related to high employment rates for participants. These elements focused on retraining women to either engineering or computer science, the presence of an internship or practicum experience, training for longer than six months, and the presence of a large number of employment-related objectives in the proposal. More subjective elements critical to project success appeared to be a well-formulated project design, including a clear management plan and a strong nontechnical component comprised of career and personal counseling, definite goals for knowledge gain, knowledge of the local job market, adequate lead time for participant recruitment and selection, and a realistic budget.

Other promising implementation strategies were discussed. The strategies included suggestions for participant recruitment and selection (an introductory conference) and for instructional techniques, such as the use of a problem-solving approach, self-paced instruction, the integration of participants with more traditional students, scheduling, child care, granting degrees or credit, an industrial advisory board, project location and leadership, and departmental cooperation. The project's plans for institutionalization in the absence of NSF funds were also described and either emphasized integration into other university programs or continued special status.

7. CONTEXTUAL ANALYSIS OF FACTORS AFFECTING THE SUCCESS OF CAREER FACILITATION PROJECTS

Contextual analysis is a technique adapted from operations research that attempts to examine the factors external to a project that influence its outcome, i.e., a systematic enumeration of the legal, political, and social characteristics (context) in which the projects operate. The analysis attempts to identify those characteristics affecting program success and failure, and to determine whether program conceptions and ideals may flourish in any given environment.

The contextual analysis presented in the following tables represents a "think" piece. It is by no means complete, i.e., although the more obvious and potent factors are identified, many lesser ones have been neglected.

A glance at Tables 7.1, 7.2, 7.3, and 7.4 indicates that economic factors will have the most critical impact on project success. Specifically, individual economic factors will influence project participation since a woman may decide to reenter the job market on the basis of the cost of the educational transition and the potential economic gain. Availability of jobs for completers will influence participant satisfaction and the future recruitment of participants. On the other hand, if the supply of personnel was extremely limited, the program might not be necessary, as women would be able to obtain employment easily. Forecasts regarding the future of economic factors influencing

TABLE 7.1. SOCIAL FACTORS AFFECTING CAREER FACILITATION PROJECTS

Social Factors	Quality of Information	Impact on Project	History/Future Trends	Implications For Action	Implications For Evaluation
1. *Movement mature woman to labor force	adequate	Movement will have positive impact on project recruitment	Numbers increasing rapidly and will continue to increase	Increase number of programs	Judge need against numbers currently wishing to reenter
2. *Women's traditional status/women's movement	inadequate	History or tradition has negative effect on project participation	Trend away from tradition continue at decreased pace	Include discussions of traditional roles of women--deal with conflicts/guilt	Determine whether target population has traditional attitudes
3. Fertility	adequate	Decreased fertility will increase demand for projects	Fertility rate will continue to decrease	------	------
4. Increased life span of women	good	Longer life/work years increases demand for projects	Increased lifespan will continue to increase	------	------
5. *Attitudes of husband/children	inadequate	Liberal attitudes will increase demand for projects	Attitudes will continue to become slightly more liberal	Offer discussions of ways of dealing with family changes	Estimate family difficulties encountere by participants
6. Lack of mobility	inadequate	Lack of mobility will decrease participation	Mobility may increase slightly but not substantially	------	------
7. Increased divorce rates	adequate	More divorced women seeking employ. Will increase demand for projects	Number of divorces may increase	Treat women as head of households	Examine logistical problems of head of household
8. Prestige of science in society	adequate	Decreasing prestige of science will decrease demand for projects	Unknown	------	------
9. Historical relationship between academia and industry	inadequate	Lack of academic credibility to industry	Unknown	Projects offer degree/ use industrial personnel in planning	Examine industry's view of training programs
10. Historical prestige of "women's" programs	good	Low prestige will affect project credibility	No evidence of change in prestige	House projects with status dept. and/or institutions	Examine effect of prestige factors
11. Historical involvement of women in administration	good	Lack of experience of project directors may negatively impact projects	Little evidence of change	Provide technical assistance to project directors	Examine background of project directors

*Critical to project success

TABLE 7.2. ECONOMIC FACTORS AFFECTING CAREER FACILITATION PROJECTS

Economic Factors	Quality of Information	Impact on Project	History/Future Trends	Implication for Action	Implication for Evaluation
1. Supply of S&E personnel	good	Supply considered adequate--negative impact on projects	Supply has traditionally fluctuated/ supply may decrease	Emphasize projects when supply drops	Judge hiring ratios against current unemployment figures in vicinity
*Demand for S&E personnel	adequate	High unemployment rates will have neg. impact on projects	Demand has traditionally fluctuated/ demand may increase	Emphasize projects when demand increases	Judge hiring ratios against current unemployment in vicinity
*Wages offered for S&E Employment	average	Increased wages will increase demand for projects	Wages have not showed gains sufficient to offset inflation	Projects attempt to place graduates in well paying job	Evaluate perception of starting salaries, evaluate current salaries
Cost of substitute mother services/child care, housework, etc.	good	Greater cost of substitute services will diminish demand for projects	Cost has probably risen faster than S&E wages	Project help to arrange inexpensive support systems for participants	Evaluate net economic gain of employment
Cost of Education	good	Greater cost to individual will decrease participation	Cost has steadily increased and will continue to do so	Financial incentive/ scholarships offered to participants	Estimate economic status of target population
*Part-time/flexitime jobs	inadequate	Unavailability of part-time and flexitime jobs decreases demand for projects	Flexitime arrangements may increase in next few years	Projects may make extensive effort to locate part-time jobs	Estimate number of target population only willing to work part-time
*Availability of financial support	adequate	Increase support may increase demand for projects, but at least some evidence that women not take out loans	Scholarship availability for women has been increasing; probably will not continue to do so	Projects might help participants obtain financial assistance	Estimate financial sacrifice women are willing to make
8. Availability R&D support	good	Availability of traditional R&D may decrease interest in sponsoring projects	Availability of R&D continue at same level or decrease	Projects sold to institutions as alternative means of support	Examine R&D funding of department

* Critical to project success

TABLE 7.3. EDUCATIONAL FACTORS AFFECTING CAREER FACILITATION PROJECTS

Educational/ Knowledge Factors	Quality of Information About the Factor	Impact on Project	History/Future Trends	Implications for Action	Implications For Evaluation
1. Size of educational enrollment	good	Decreased student enrollment means institutions more receptive to non-traditional students	Decline will probably continue	Offer projects as way to increase enrollment	See if schools applying for funds are suffering decrease enrollment
2. Faculty support for members	good	Decrease in number of faculty supported by institution may increase interest in projects	Decline will probably contine	Offer as support for faculty members	Estimate faculty status of principle investigators
3. Increase mature female enrollment in college/community colleges	good	Increased number of women will have a positive impact--more support for women's programs in general	Trend of increase will probably continue	Examine role of community colleges housing in projects	Examine whether CF institutions have other programs for mature women
*4. Rate of technological advancement	average	High rate of change will increase need for projects	Trend of rapid change will continue	Incorporate most recent technological advances in CF courses	Judge course content for currency, adaptability
*5. Rate of theoritical advancement	average	High rate of change will increase need for projects	Trend of rapid change will continue	Incorporate most recent advances in CF courses	Judge course content for currency, adaptability
6. Number of women's continuing education centers	inadequate	Positive impact--women's centers help meet needs of women and advocate women's issues	The number of centers and services offered will probably continue to increase	Projects may want to coordinate more closely with centers	Evaluate services already provided
7. Industrial training programs	inadequate	Good in-house training programs should reduce the need for projects	No evidence that programs exist for this population	Make projects complementary to industrial training programs	Examine industrial training programs

*Critical to project success.

TABLE 7.4. LEGAL/POLITICAL FACTORS AFFECTING CAREER FACILITATION PROJECTS

Legal/Political Factors	Quality of Knowledge About the Factor	Impact on Projects	History/Future Trends	Implications for Action	Implications for Evaluation
1. *Affirmative Action legislation/programs	inadequate	Affirmative action legislation increase marketability of project graduates	Affirm. action compliance has not been good/activity will likely decrease in next few years	Present CF programs to industry as means of meeting affirmative action goals	Examine affirmative action goals of S&E industry
2. Kennedy Bill	good	Positive effect on projects, even if not passed, increase interest & awareness of CF programs	No current efforts to pass bill to date, but may increase in next two years	------	------
3. Bakke Decision	inadequate	Probably negative impact on projects	------	------	------
4. Title IX	good	Slightly positive	------	------	------
5. Age Discrimination Laws	inadequate	Slightly positive	Reporting/self eval. not currently being conducted by industry	------	Obtain data on age practices in hiring in S&E industry
6. Development of new Depart. of Education	inadequate	Unknown	------	------	------
7. Political pressure brought by women's groups	inadequate	Positive effect on projects	Efforts will be directed toward ERA passage next few years, currently no lobby for women scientists	------	------
8. Prestige of program within NSF	inadequate	Negative effect on projects	------	------	------
9. ERA passage	adequate	ERA defeat will neg. affect projects	------	------	------

*Critical to project success.

S&E employment are unreliable at best; however, with the exception of engineering and computer science, the demand does not look encouraging for most scientific fields.

The other factor critical to project success identified in the contextual analysis is the participant's perception of herself, i.e., that her own needs and ambitions are as important as those of her family. This perception has been fostered by the women's movement. Although the political visibility and gains of women may slow in the coming years, women and their families will probably continue to alter their perception of women's roles, and the demand for preparation for reentry programs will increase.

8. OTHER EXISTING PROGRAMS FOR REENTERING SCIENTISTS

DRI proposed to assess selected non-NSF sponsored programs similar in objectives to the Career Facilitation Projects. The identification of the projects was part of the needs assessment. Locating and describing the programs would indicate what options and alternatives are currently available to women with backgrounds in science who wish to reenter graduate school or the labor force, i.e., what needs are now being met. Knowledge of the current alternatives separates the activities of the Career Facilitation Program that overlap with existing programs from its unique contributions and services. This can indicate to NSF the type of programs that are the most needed and have the greatest potential impact. It was anticipated that an examination of non-NSF sponsored projects might identify viable strategies also capable of accomplishing NSF objectives. This examination may produce information enabling NSF to develop more effective project strategies.

The basic objective of the Career Facilitation projects is reentry or career change. The discontinuous work pattern of women that makes reentry necessary or desirable is only beginning to receive noticeable attention; still there have been several massive efforts directed at career change and job reentry in our society prior to the new consciousness of women.

One major career change effort attempts to employ unemployed welfare recipients. These large programs, usually sponsored by the

Department of Labor (CETA), typically provide vocational testing, skills training, and job placement. The programs have been primarily aimed at women or men without a college education and have not been notably successful, probably due as much to structural incentive and motivational factors as the training itself.

A second example of retraining programs involved engineers (Aerospace Employment Projects 1974). During the downturn in aerospace employment in the '60's, thousands of highly trained engineers were unemployed. The government offered specialized programs to retrain these engineers in areas where the demand was greater. These programs were unsuccessful for motivational reasons. In many cases the engineers were not willing to leave their present location or the engineering profession and did not apply for the programs. However, these programs probably produced the most successful cases of career change; many ex-aerospace engineers applied their talents in project management to education, poverty, and other social programs (Lantz and West 1974).

There are currently two highly successful examples of career transitions both involving large numbers of military personnel. Carol Shaw, Assistant Dean at the University of Dayton, points out (personal communication 1978) that the GI bill is the largest reentry program in history, supporting the training necessary for millions of veterans to obtain civilian jobs. There are at least two obvious reasons why this program is successful. First, it has built-in financial incentives for training, above the cost of the education. Second, it has been in existence long enough to possess visibility; personnel can plan on using it from the onset of their military service.

Military personnel who retire from active duty in the prime of their years often initiate a second career. Although the individuals do not have special assistance programs (other than comfortable pensions) their "career change" is something most of them contemplate and plan many years prior to its occurrence. Very few women have been retrained after separation from military service and very little knowledge accrued on effective procedures.

In its examination of alternative programs, DRI concentrated on programs specifically designed for women with backgrounds in science. The present Career Facilitation Programs have two distinct components; science education programs and women's programs. Continuing education programs for scientists and engineers and continuing education programs for women were examined and are discussed in the following sections.

Three procedures were used to identify programs with objectives similar to the Career Facilitation Program, i.e., programs designed to assist women to reenter the labor force or graduate school. These methods included a literature review, a mail survey and networking.

In conjunction with other "women's projects," DRI has maintained an extensive library on training activities for women, including federal reports, newsletters and magazines. Approximately 50 sources were found that described programs thought to be similar in objectives to the Career Facilitation Program.

DRI surveyed women's studies departments to obtain information on other programs. DRI enclosed a cover letter on a mailing from the National Science Foundation to 275 women's studies departments. The letter requested the return of an enclosed post card if they knew of any reentry program for women with backgrounds in science. About 35 responses were received; about half stated that they did not know of any such programs. In addition, DRI and Associates for Research in Behavior mailed a letter to 651 women's centers asking whether they knew of any reentry programs for women with backgrounds in science. Ninety-nine responses were received and over half of the respondents were aware of such programs. Almost one-fourth of the letters were returned for incorrect or obsolete addresses. The Office of Opportunities in Science of the American Association for the Advancement of Science was developing a roster of programs for women in science. Although their interest was not restricted to reentry women, all information they received that appeared to involve programs for women already trained in science was forwarded to DRI. Finally, a survey was also sent to 43 women's groups and women's caucuses of scientific and professional organizations asking them what activities they sponsored for women with backgrounds in science, or whether they were aware of any specific programs sponsored by other groups. Eleven organizations responded but none knew of non-NSF programs to update science skills.

Each of the programs identified by the mail surveys were contacted by telephone, and the respondent often suggested other appropriate programs or people. Approximately 55 programs were identified in this manner.

In sum, more than 1,500 organizations were contacted by mail, and more than 200 programs were identified. Those programs that were judged to be relevant were contacted by telephone if insufficient written information was available on the program. About 150 telephone interviews were conducted.

The telephone interviews involved questions about the nature of the project, who was eligible for it, who sponsored it, its duration and/or continuation, its success rate, any evaluations they had conducted, and other relevant parameters.

The most prominent fact about continuing education programs in science or continuing education programs for women is that it is very difficult to get a bird's-eye view. The women's projects form a kind of "underground," where only small scattered pieces are visible; where each is idiosyncratic to the environment and the project director. They are often transitory, e.g., in the year between the publication of a bibliography of centers and the mailing of our survey, almost a quarter of them had "gone out of business." In addition, there generally seems to be a lack of awareness of other related programs on the part of project personnel and there is little federal or state coordination of activity. The picture portrays the centers to be typical of true grassroots movements. A similar difficulty was encountered in getting an overview of continuing education within industry--there appear to be few generalizations but many specific programs or seminars.

Two major findings emerged from our examination of these programs: (1) there is virtually an infinite number of them and the number is growing, and (2) few are relevant to the retraining needs of reentering women with backgrounds in science. Few special refresher courses for unemployed scientists and engineers were found. The few identified were either specialized continuing education for already-employed scientists, sponsored by employers, or continuing education programs designed for individuals not having a bachelor's degree.

Women's Continuing Education

Continuing education for women has become a signficant component of the educational system, as evidenced by the more than 500 continuing education courses, services, and programs for adult women offered throughout the country (Wells 1973).

The goals of continuing education programs for women have tended to be very broad. They include attempts to; (1) provide academic training, (2) provide personal enrichment and resolution of personal/identity problems and (3) provide technical or interpersonal skills.

The programs examined by DRI varied considerably, dependant on such factors as the expressed needs of the mature women in the area, the special talents of interested faculty members or concerned community leaders, or the demands of the local labor market.

The following types of elements contained in different combinations in the continuing education programs were found:

	%*
Group or individual counseling	Most
Vocational testing, career guidance and planning	Most
Skills acquisition/academic training	
• tutorial assistance	
• literacy/catch-up course work	
• course content modified for adult students	
• part-time enrollment or limited course load	60
• more convenient scheduling of courses	
• liberal provision for transfer of credits and/or alternative study (credit for life experience, etc.)	
• credits by examination	
• independent study	
• at-home or media study	6
• paraprofessional skills training	46
Orientation seminars or workshops	55
Support groups/student organization	19
Comprehensive career change programs	
Industrial training programs/internships	
Network information centers/job referral services	
Job placement programs	
Child care provisions	15
Financial assistance/referral	43
Consortium arrangements	13

(p. 133)

*In order to determine the frequency with which the varying program elements were available, we analyzed a report on continuing education by the Department of Labor and tabulated the approximate percentage of programs having that element (DOL 1971): Blanks indicate that the percentage was not given.

Wells (1974) describes several major types of structured women's programs that incorporate combinations of emphasis and features. These are: comprehensive programs (covering many of the basic features named above); general orientation courses (providing an overview of educational, employment, and volunteer opportunities along with some counseling); study toward completion of a baccalaureate degree (assisting former dropouts); part-time programs in graduate education; retraining programs in specific fields; courses leading to semiprofessional work; and programs with innovative curriculum or educational practices. Emerging programs appear to emphasize helping employed women with career development and advancement to managerial positions, new methods of helping low-income women, and consortium arrangements among some colleges and universities to extend the benefits of programs for women beyond the scope of a single institution or location.

The survey of programs designed for reentry women produced the following conclusions:

- There are very few comprehensive programs.
- Most are inadequately financed.*
- Most are not prestigious or even central to host institutions.
- There is little networking among projects, and no national coordination of projects.
- Most do not offer direct financial aid to students, especially part-time students.
- Geographic distribution is limited.

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*Also conclusions of Bell, Bikson, Rich and Wuchitech (1976).

- Many female students are not aware of existing services for women (Elliason 1978, Magill and Cirksen 1978).
- There is almost no evaluation data available on the programs.*

Science Education

The survey of science education courses, either within universities or industry, resulted in the following findings:

- Almost no specific refresher courses in science are offered either by industry or universities.
- There are very few retraining/career change programs for scientists.
- Industrial science education and tuition reimbursement programs are not available to nonemployees, and no company expressed interest in providing technical skills to potential employees.
- Private sector employers tend to offer nonscience-related continuing education courses.
- A wide range of nontraditional media or independent study programs are available.

Summary

In our opinion, the National Science Foundation is providing a unique service not available to the women elsewhere at any cost. Specifically, since regular credit courses do not update obsolete skills, but start from an undergraduate baseline, updating skills in a particular field might require several years of additional college or graduate courses. Since retraining options are not currently available outside of the NSF projects, updating may be as time-consuming as original training. In our opinion, then, these programs should be viewed equally as science education courses and women's programs.

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*Also conclusions of Bell, Bikson, Rich and Wuchitech (1976).

A few examples of reentry programs most similar to the Career Facilitation Program are given in Appendix D in order to provide information about the diversity of programs and their content, and a list of the project contacts by type of program made during the survey has been compiled as a bibliography and is included in Appendix E.

9. EMPLOYERS SURVEY

One of the goals of the Career Facilitation Program is to assist women scientists to enter or reenter the labor force in a degree-related field after periods of unemployment or employment in a position not related to their degree. Most programmatic efforts have focused on preparing reentering women for participating in the labor force by; (1) updating or upgrading technical skills, (2) training for job readiness and (3) developing realistic perceptions of the work environment.

Little or no attention has been focused on understanding how employers perceive the women reentering the labor force either by NSF or by project directors. Understanding the strengths and weaknesses attributed to these women and ascertaining how reentering women are perceived relative to other applicants is important to improving the preparation of women for employment and to improving the effectiveness of job seeking and job placement efforts.

Since the focus of the Career Facilitation Program is on the women scientists and not the employers, a full-scale survey of employers was not undertaken. However, a small sample of personnel officers of companies employing scientists and engineers (S&E) were interviewed by telephone. It was anticipated that the results of the survey might be used to develop hypotheses concerning the necessary components in programs to assist reentering women to make a successful transition to the work environment.

A stratified sample of 40-50 companies was randomly selected on the basis of the Standard Industrial Classification, the size of the company and its geographic location. In order to complete the interviews, a total of 334 companies were contacted by telephone. Of the 334 companies contacted, 131 companies had too few employees to include in the sample (less than 50), 92 companies did not employ scientists, 33 of the personnel directors/managers refused to answer the questions, 31 of the personnel directors/managers were out of the office and 4 companies refused to provide some of the required information and were excluded from the analysis. Forty-three interviews were completed. A copy of the interview format is included as Appendix F.

In most cases, the interview was conducted with the personnel director/manager who was responsible for hiring all company personnel. In a few large companies the interview was conducted with the person responsible for hiring S&E personnel and in a few small companies the interview was conducted with a Vice President of the company. Appendix C shows the names, sizes, and geographic locations of the companies included in the survey.

Future Hiring

The average number* of S&E personnel hired during the previous year by companies included in the sample was 11 (SD = ±16). The maximum number of scientists hired by any one company during the previous year was 63. Twenty-three percent of the S&E personnel hired during the preceding year had no employment experience as scientists. The companies reported the average number* of applications received from women entering the S&E job market later in life was 16 (SD = ±88). Of the scientists hired during the previous year, approximately 21 percent had Ph.D.'s, 24 percent had master's degrees, 48 percent had bachelor's degrees, and 7 percent had less than a bachelor's degree.

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*These were logarithmically transformed in further analysis to reduce the skew.

When queried regarding number* of scientists to be hired in the coming year, the companies estimated an average of 9 (SD = ±13). The maximum expected number of hires by any one company was 50. Sixty-three percent of the companies definitely anticipated hiring S&E personnel in the coming year, 21 percent were uncertain as to whether they would be hiring any scientists, and 16 percent did not anticipate hiring any scientists. Of those anticipating hiring S&E personnel, 40 percent anticipated hiring chemists, 33 percent anticipated hiring engineers, 21 percent anticipated hiring mathematicians and computer scientists, 19 percent anticipated hiring biological scientists and 19 percent anticipated hiring some other type of scientist.

Employers' Perceptions of Reentry Women

The employers were asked to describe the strengths and weaknesses of those job applicants who are women entering the job market later in life. Table 9.1 shows the percentage of the employers who attributed each strength and weakness to reentering women. The data used to

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*These were logarithmically transformed in further analysis to reduce the skew.

TABLE 9.1. STRENGTHS AND WEAKNESSES ATTRIBUTED TO REENTRY WOMEN SCIENTISTS

Strength	Percent of Sample Attributing Characteristic
Maturity	42%
Stability	40%
Career Orientation	30%
Desire to Achieve	21%
Willingness to Learn	9%
Don't Know Strengths/No Comment	19%
Weaknesses	
Outdated Skills	47%
Work Adjustment Problems	30%
Older	9%
Noncareer Orientation	7%
Don't Know Weaknesses/No Comment	19%

generate this table were the responses to an open-ended question. Therefore, only those attributes mentioned by employers are included in the table.

The employers were also asked how job applicants who are women scientists entering the job market later in life differ from other applicants for S&E positions. This question was also open-ended and thus only those differences mentioned by employers are included. Table 9.2 shows the percentage of the employers who mentioned each difference.

A factor analysis of 12 attitudinal statements about job applicants yielded two factors. One factor, a "male-female" factor, accounted for 23 percent of the total variance and had an alpha coeffecient of .73. The other factor, an "experience" factor, accounted for 15 percent of the total variance but had an alpha coefficient of .53. Although further analysis used the factor scores, the responses to the open-ended questions were more informative and reliable and outweighed discriminations made on the basis of the factor scores. That is, perceptions of stability, career orientation, discussed below, were more important than "male-female" distinctions.

Hiring Criteria

The preceding table indicates that specific characteristics are attributed to women scientists attempting to reenter the labor force. These attributes include both strengths and weaknesses. It is particularly important to understand whether these perceptions influence hiring criteria and behavior.

TABLE 9.2. DIFFERENCES ATTRIBUTED TO REENTRY WOMEN SCIENTISTS AND OTHER APPLICANTS

Difference	Percent of Sample Citing Difference
Reentering women have more outdated skills	26%
Reentering women are older	9%
Reentering women are more career oriented	9%
Reentering women are more insecure	9%
Reentering women are more mature	7%
No differences noted	5%
Don't know/Can't say	35%

There was no significant difference between the attributes that companies reported looking for in S&E personnel and the attributes they thought reentering women scientists should have. In both cases, the most frequently mentioned attribute was proper academic background for jobs. The second most frequently mentioned attributes were technical competence and work experience. Furthermore, there were no significant differences between the distribution of education level among scientists employed during the previous year and the education level that they reported reentering women scientists should have. These data would suggest that the employers are seeking the same attributes in all potential employees and are not adjusting hiring criteria in response to the unique attributes of reentering women scientists.

The hypothesis that employers are seeking the same attributes in all potential employees was further examined by analyzing the reported hiring behavior of the companies. Thirty-three percent of the companies reported having hired women scientists who were entering the job market late in life.* Nearly all the reasons given for hiring these women can be categorized by the description "met all the qualifications." Sixty percent of the employers reported that they had not hired reentering women scientists during the past year. The reasons given, in order of frequency, were; (1) that none had applied, (2) the company had no openings and (3) the applicants lacked the necessary skills. The remaining 7 percent of the companies did not know whether any reentering women scientists had been hired.

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*Careful examination of these responses indicated that all of the reentry women hired had recently completed some educational courses.

In combination, these data suggest that the most critical variable in the decision to hire or not hire a reentering woman scientist applicant is her educational preparation for the job. This hypothesis is further supported by the data provided in response to the perception of industry's role in training reentering women. The most frequently suggested activities were specialized training for industry, review/refresher courses, general programs to better understand industry and training in computer science. Only one person suggested time management and organizational skills and only one person suggested skills for personal presentation.

Forty companies answered questions on whether they had hired any reentering women as scientists in the past and whether they expected to in the future. These companies were divided into two groups; (1) those that hired reentering women and intend to hire them in the future and (2) those who had not hired reentering women and may or may not intend to hire them in the future. A discriminant analysis was used to determine how the two groups differed.

The group that had hired reentering women and intended to in the future was characterized as more likely to:

- Hire people without job-related work experience.
- Have a large number of reentering women as job applicants.
- Hire chemists.*

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*This finding is probably an artifact of the large proportion of chemical firms sampled.

- Recommend that women do have science-related job experience to make them more employable.
- Perceive reentering women as having a desire to achieve.
- Perceive reentering women as stable.
- Perceive reentering women as career-oriented.
- Hire people with a master's degree or more education.*
- Perceive that industry can help train reentering women.

The discriminant function generated on data from the 26 companies which had answered all the questions was used to predict the classification of all the 40 companies, including ones that had some missing data but had complete criterion data. The function correctly classified 85 percent of the companies. This correct classification rate is greater than the chance classification rate of 65 percent. This correct classification rate would suggest that the characteristics listed above can be used to discriminate between those companies who might hire reentering women scientists and those who probably would not. In addition, the analysis suggests specific efforts to change employer's attitudes that might result in additional companies desiring to hire reentering women.

In addition to the discriminant analysis, a correlational analysis was run with all the behavioral and perceptual data from all the companies. This analysis yielded the following significant relationships which may have implications on future program design:

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*This finding is probably an artifact of the large proportion of chemical firms sampled.

- The companies that predominantly hire people with bachelor's degrees want applicants to have job-related experience.
- The companies who predominantly hire people with more than a bachelor's degree are large companies.

Summary

The results of the employers survey have several implications for program design which merit further exploration.

Those projects which accept women with bachelor's degrees and which do not confer advanced degrees upon program completers should have cooperative arrangements with industry so that the reentering women scientists have job experience. Further, those projects which are not planning to integrate job experience into the project should probably consider accepting only women with advanced degrees or should consider completion of a master's degree as part of the required project curriculum.

Before designing the curriculum, project staff should explore with local industry the educational requirments for employment and insure that all graduates can meet or exceed employers' educational requirements. In addition, each project should explore with local industry what components of training industry is willing to provide for reentering women scientists.

In job seeking and job placement efforts, projects should attempt to insure that graduates are perceived as: (1) having all educational requirements, (2) having job-related experience (if possible) and (3) being stable and career-oriented with a desire to achieve. This perceptual attitudinal factor suggests both specific attitudes the women may learn to convey to employers as well as general attitudes that should be encouraged in employer groups.

10. SCIENCE EDUCATORS' VIEWS OF CAREER FACILITATION PROJECTS

In order for the Career Facilitation Program to enjoy long-term success through continuation of programs for mature women without NSF funding, the projects will have to be attractive to and provide benefits for the institution and its faculty, as well as to the participants. Because of this and the fact that there has been limited response to the solicitations for projects, DRI undertook a survey of science educators and administrators across the country to determine if the respondents were aware of the solicitation and whether or not they would be interested in submitting, or encouraging another faculty member to submit, an application for funding for such a program and why. In addition, the survey asked their opinion of how running such a program would contribute to a faculty member's tenure.

The survey questionnaire was sent to 200 colleges and universities representing every state in the United States. The schools were selected from the National Center for Educational Statistics' Education Directory, 1976-77 Colleges and Universities.

The selected sample represented a mix of public and private schools, large and small schools and academic discipline of the interviewee. A breakdown of the survey sample selected is shown in Table 10.1.

TABLE 10.1. SURVEY SAMPLE OF EDUCATIONAL INSTITUTIONS

Public Institutions	123	Enrollment under 10,000	100
Private Institutions	77	Enrollment over 10,000	100
	200		200

Recipient:	Engineering Deans	84
	Arts and Sciences Deans	57
	Science Deans	42
	Directors of Special Programs*	17
		200

*Includes directors of Continuing Education, Lifelong Learning, Women's Studies Programs, and Special Programs.

Although it was not possible to determine the specific schools from which the surveys were returned, the questionnaire forms were coded so that the category from which the response came could be identified.

The postcard survey form was accompanied by a personal letter to the recipient briefly explaining the Career Facilitation Program and the rationale for the survey. The questions asked on the survey included:

1. Were you aware of the NSF solicitation for programs for mature women?
2. Would you be interested in bidding this program or encouraging someone on the faculty to bid it? Why or why not?
3. Would running a women's science education project contribute to a faculty member's requirements for tenure? (very much, only a little, not much)

Of the 200 survey forms sent out, 86 (43 percent) were returned. The questionnaires were returned in approximately the same percentage for each category as they were sent out.

Awareness of the Program

Responses to the first survey question, "Were you aware of the NSF solicitation for programs for mature women?" showed that only 34 percent of all respondents were aware of the NSF solicitation, while 66 percent were unaware of it. As shown in Table 10.2, engineering deans were the only category of respondents where more had heard of the solicitation than not.

TABLE 10.2. PERCENTAGE OF RESPONDENTS AWARE OF CAREER FACILITATION PROGRAM

	Number Responding	Percent Aware
Public institutions	56	32%
Private institutions	30	37%
Enrollment over 10,000	47	38%
Enrollment under 10,000	39	28%
Engineering deans	38	53%
Arts & Sciences deans	21	14%
Science deans	20	25%
Directors of special programs	7	14%

Interest in Implementation

The second survey question was: "Would you be interested in bidding this program or encouraging someone on the faculty to bid it? Why or why not?" It is interesting that although the engineering deans category was the only category of respondents where more were aware of the solicitation than not, responses to the second question, given in Table 10.3, showed that engineering deans was the only category where more respondents were not interested in bidding the program than interested in bidding (regardless of if they were aware of the solicitation or not). The percent of each category that was interested in bidding for a project was approximately the same for respondents who were previously aware of the programs and for those who were not.

Reasons for not being interested in bidding on the program were given by 30 of the respondents, many of whom cited several reasons. With the exception of three comments cited only once, the comments were easily grouped into four categories.

The most frequently cited reason, particularly among engineering deans, was that the institution's student/faculty ratio was high with the result that the faculty was overextended. These respondents felt that housing such a project at their institution would create too much of a burden on the faculty. The second and related reason cited was that the institution's facilities and resources were already overloaded, preventing them from taking on a new project of this kind because of lack of space.

Another frequent comment was that the respondent's institution was located in an isolated rural setting which afforded a small or nonexistent participant pool from which to draw for such a project. The fourth reason cited centered around the belief that opportunities for

TABLE 10.3. INTEREST IN IMPLEMENTING CAREER FACILITATION PROJECTS

	Number of Respondents	Interested in Bidding	Possibly Interested--Would Like More Information	Not Interested
Public institutions	56*	48%	13%	21%
Private institutions	30	33%	13%	46%
Enrollment over 10,000	47	45%	13%	38%
Enrollment under 10,000	39	41%	13%	44%
Engineering deans	38	34%	3%	63%
Arts & Sciences deans	21	52%	14%	24%
Science deans	20	55%	20%	20%
Directors of special programs	7	29%	43%	29%

*Percentages apply to the specific categories where they are shown. These percentages do not always total 100% because not all respondents answered the question.

mature women with a B.S. to enter existing programs are already available. In other words, they did not see meeting the needs of these women as a priority.

Reasons for being interested in bidding such a program were given by 24 of the respondents. Again, with the exception of three comments that were cited only once, the comments were easily grouped into three categories. The most frequently cited comment was simply that there was a need for this kind of project. The second most frequent comment was that they and/or their institution had a strong interest in, or commitment to, educating women. Finally, the fact that this kind of project would provide a stimulus to the science department or the institution to generate innovative approaches to learning was cited as a reason for interest in bidding.

Contribution to Professional Development

The final survey question asked whether running a project would contribute to a faculty member's requirements for tenure. Three choices were given: very much, only a little, and not much. Of the respondents answering the question (85), 15 percent indicated it would contribute "very much," 6 percent believed the contribution to tenure was between "very much" and "only a little." "Only a little" and "not much" were both checked by 39 percent of the respondents. The respondents' comments to this question indicate that this question was fairly narrow, difficult to answer, and required more information to be adequately answered. For example, many respondents stated that it may contribute positively to tenure considerations, provided the project was a well-run experimental investigation and provided that other aspects of a faculty member's duties were up to standards. The following quote from one of the respondents typified the sentiments of many of the respondents: "If the project director is an effective teacher and conducts such programs in the mode of educational research, then indeed tenure would accrue to the project director. On the other hand, if project directors are selected merely to provide an administrative function for such programs, then it is most unlikely that a tenure decision will reflect the ability of the project directors in relation to the Career Facilitation Program."

Summary

Based on engineering departments' mushrooming enrollments in the last few years that have not been accompanied by significant increases in the faculty size, engineering faculties tend to be overloaded and overcommitted. Given this situation, it is not surprising that the majority of engineering deans responding to our survey showed little or no interest in the Career Facilitation Program. In addition, with large numbers of women now enrolling in engineering programs, many in this field do not recognize any problems for women entering or reentering the field. On the whole, respondents from this discipline did not see many benefits accruing to the faculty or the institution. The other disciplines (Arts and Sciences, Science, and Special Programs) were more positive about the benefits of such a program.

These facts suggest that the NSF may attract more interest and long-term commitment to the Career Facilitation Program by redirecting the solicitations to a wider, more diverse audience; especially in light of the fact that almost 30 percent of those who were not aware of the solicitation showed sufficient interest in the program to request additional information.

Another interesting result of the survey showed that many of the schools that had an interest in the program were located in non-urban areas which do not generally provide a sufficient participant pool. At the same time, these schools do not generally experience overloaded campus facilities and overextended faculties due to very high enrollments. It may be helpful for NSF to aid in the identification of a national participant pool that could be grouped geographically to provide a larger base from which these isolated schools could draw participants. This may mean, however, that more of the participants would require financial aid if it were necessary for them to relocate or travel some distance to attend the project.

11. PANEL REPORT

An 18 member panel discussed DRI's evaluation and made recommendations regarding continuation and revision of the Career Facilitation Program. Panel members included representatives from scientific societies, industries employing scientists, women's centers, a Career Facilitation Project director, NSF program personnel, and DRI project consultants and staff members.*

The panel addressed topics and issues which might have a future impact on women who choose to reenter/retrain in a science profession. Panel members were also asked to make recommendations concerning the future of the Career Facilitation Program; including possible program alternatives, future program design, and sources of funding.

Prior to the panel meeting, participants were sent a draft copy of DRI's evaluation of the Career Facilitation Program. The first session involved a discussion of the evaluation results. DRI staff members presented a brief chapter-by-chapter summary. Following each chapter summary, the panel members were asked to discuss the data, its reliability and validity, and to identify missing information.

The second session of the conference attempted to integrate and summarize the evaluation findings and made the specific recommendations given in this chapter. In addition to the issues outlined in the evaluation report, panel members identified and discussed alternative approaches for Career Facilitation Program. They recommended ways NSF could revise or expand evaluative and experimental programs to determine the utility of the suggested strategies. The panel members also discussed unresolved issues in current Career Facilitation Projects; such as populations served, institutional support and financial support/assistance.

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*See Appendix H for the list of panel members.

The panel members did not reach a consensus on all issues. The following is a description of the issues identified and the recommendations relevant for the future direction of the NSF Career Facilitation Program.

Panel Findings

The panel examined the explicit and implicit assumptions made by NSF in regard to the Career Facilitation Program listed in Chapter 1 to determine which should continue to serve as the assumptions of future programs.

The panel felt that there is a demonstrable need for programs to update the skills of women scientists. Specifically, the panel agreed with the following assumptions:

- Women are underrepresented in science careers.
- Science knowledge and/or skills become outdated in most fields.
- Most scientists cannot or do not keep up with the advances in their fields when they are not employed, are underemployed or employed out of their field.

- Most scientists are not able to gain employment in science and engineering after a career break without some updating of skills.

The panel also felt that the Career Facilitation Projects were an appropriate intervention to address the need, although many felt that this should not necessarily be the exclusive focus. Specifically, they felt the following assumptions were valid:

- Science updating for previously trained women is an important intervention for this group of women.
- Updating of science skills may produce an increase in the participation of women in science if jobs are available.
- There is an adequate number of women with backgrounds in science to justify funding Career Facilitation Projects.
- There is an adequate number of science and engineering educators interested in and able to implement these projects.
- The projects, on the whole, may provide the assistance necessary for the participants to reenter graduate school or employment, and Career Facilitation Projects may provide an educational experience that is acceptable to employers and science and engineering departments.
- A reasonable social and economic climate exists for project success.

- Projects should be initiated only in scientific disciplines and geographical areas in which job openings are predicted to occur.

Although the DRI evaluation found little evidence that other alternatives exist to accomplish NSF objectives for this target group, many of the panel members felt that professional societies offered applied and theoretical science courses that could serve to update knowledge and skills.*

The panel had greater diversity of opinion regarding many specific procedures of project implementation. Remembering that the panel considered employment to be the long-range objective, whether or not the participant sought additional graduate education, most of the panel felt that:

- Many reentry women need information about the job market and some vocational and personal counseling.
- Many reentry women need peer support.
- Many reentry women have special scheduling requirements.
- Some women will relocate to obtain updating of science skills.
- Industrial input is important in establishing project credibility to industrial employers.

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*DRI contacted the professional societies in chemistry, biology, and physics, and did not find any directly relevant and/or complete course material to fully update scientists. However, some material that could be adapted, as well as useful strategies and dissemination procedures, are available.

- Industrial internships are an important educational experience for reentry to the labor force both for the women and for industrial personnel.

Many panel members disagreed with the more general goals expressed in some of the current projects. Specifically, many felt that:

- Skills needed for reentry into the job market are different from those needed for reentry into graduate school.
- A distinction is needed on the project level between those participants who are currently working, and those who are not employed.
- Emphasis should be placed not only on obtaining entry into professional level jobs, but also on advancement in the job—but not necessarily in the same project.
- A degree should be granted at the end of the project whenever possible.
- Participants should have at least a moral commitment and obligation to seek work or further education after project participation.
- Financial assistance to participants should be distributed on the basis of need.

Many of the panel members felt that NSF should publicize the problems, projects and findings in a more active way and that the channels currently used for dissemination are not effective. Specifically, it was suggested that:

- NSF should utilize new or additional channels to disseminate information about reentry options for previously trained women scientists.
- NSF should widely disseminate the results of the current projects and the evaluation effort.
- NSF should continue to monitor the progress of the participants of the projects.

At the end of the panel meeting, some important issues were not resolved, either because there was insufficient time to address the issue or because an agreement could not be reached. These issues included:

- If NSF should decide to initiate other types of programs for previously trained women, what should these new programs look like?
- Would a program to change employers' perceptions of reentering women be an effective mechanism to increase S&E participation by women? If so, how should this program look?
- Should these projects continue to be individual, independent, self-contained projects which operate on a local level or should specialized regional centers be considered?

- Would the existence of a mechanism or procedure that enabled an individual to plan her reentry in advance increase the number of women who would choose to reenter and/or facilitate the process? Would the existence of such a mechanism increase the number of women choosing science majors/careers? How could the Career Facilitation Projects provide such a mechanism?
- Is there any method of encouraging potential employers or scientific societies to participate more directly in retraining programs?
- Engineering has bright employment prospects but engineering educators showed less interest in implementing projects than other educators. Is there any way to make Career Facilitation Projects more attractive to engineering schools? Will this same circumstance occur when any area becomes highly marketable?
- Is it possible to redesign Career Facilitation Projects so that schools which have less loaded facilities, desire more students, or are in isolated locations could sponsor the projects?
- Is there any way to increase the potential for advancement and tenure resulting from directing a Career Facilitation Project?

Panel Recommendations

The primary recommendations of the panel were the following:

- The panel recommended that the most successful of these projects should be continued; they are having sufficient success in recruiting participants, and in job or graduate school placement to justify continuation of the program. In addition, the program is an excellent learning experience for NSF program managers and project directors in meeting the needs of reentry women scientists.
- The panel recommended that the diversity of projects funded should be continued and that NSF should encourage this diversity. On the other hand, the panel accepted DRI's recommendations that NSF should establish guidelines for the project design and guidelines for the prerequisite qualifications of project staff in working with reentry populations.
- The panel recommended against making substantial changes in eligibility of the current participant population. While they felt that the projects should admit social scientists when these students had sufficient background to enter the program, the panel did not feel that special projects should be targeted to social science degreed individuals at this time.
- The panel recommended that stronger efforts be made to encourage the participation of minority and low income women.

- The panel recommended that the projects should continue to prepare the women to enter professional entry level positions. This objective includes graduate school if that is the prerequisite for an entry level position. If the prerequisite of an entry level position is a degree, the projects should grant a degree.
- The panel felt that the projects should continue to emphasize education rather than job skills. They felt that if the participants have to compete with recent graduates, they should have current theoretical and applied knowledge, both to enhance the participants' confidence and improve the employers' perception of their skills.

Several important issues regarding the projects should be addressed by further experimental projects. These issues are:

- Efforts to examine participant cost-sharing should be conducted. Several panelists agreed that the participants would benefit from being forced to make a financial commitment to the program. However, it was noted that some women may need financial assistance if this approach was taken.
- The significance and ramifications of including a broad variety of types and kinds of colleges and universities in the program should be examined. Specifically, the impact of the university's prestige on project outcome should be investigated.
- Many issues regarding project institutionalization can be resolved by examining the experience of currently

funded projects. These issues include determining whether any projects or project elements will be institutionalized, in what form they will be institutionalized, what barriers will be encountered in the process and the effectiveness of the institutionalized project in meeting the needs of reentry women scientists.

- Experiments in meeting the needs of already employed participants should be initiated.
- Longitudinal studies of the past participants should be continued to gather more data on project outcome, as well as to shed light on some unresolved programmatic issues, including determining why some project graduates are not employed or in graduate school.

In addition, the panel recommended several basic research issues, including the examination of the work place and of the experience of women, if any, who reentered it with NSF assistance. Specifically, the panel recommended an examination of:

- The placement of women within industry; organizational impediments to entry and advancement; the tools needed by women for upward mobility; employers' perceptions of reentry women; and current availability of industrial training programs.
- Women, if any, who successfully reentered the scientific labor force without benefit of an educational project; to determine their characteristics and problems; and to identify their procedures and method of reentry.

12. SUMMARY AND CONCLUSIONS

Summary of Findings

- Significantly more Congressional policy makers, the National Science Board, and scientific organizations felt the primary emphasis of programs for previously trained women should be to increase the opportunities for advancement for already employed women scientists, although increasing the number of employed women scientists was also given some support.
- Most women scientists report voluntarily being out of the labor force to care for their families. They will face many external barriers if they reenter the labor force; outdated skills, discrimination in employment and education, absence of appropriate and/or part-time employment, inadequate information about the job market and support services, as well as logistical problems such as transportation and child and family care.
- There are also internal barriers for some women scientists who wish to reenter the labor force. These include lack of self-confidence, anxiety and fear of failure, guilt, isolation from her peer group, ambivalence toward career goals, and absence of a professional identity.
- Incentives for women scientists to reenter the labor market include further development of her potential and identity, financial rewards, and a relief from boredom and feelings of uselessness.

- The total number of women scientists who would qualify for Career Facilitation Projects is about 585,000 some of whom are already in the workplace but may be underemployed.* Estimates of interest are less certain, but the demand for the projects have exceeded their availability.
- The participants of the Career Facilitation Projects typically were in their thirties, married, with degrees in chemistry, biology, or mathematics. Over one-third had spouses employed in closely related fields.
- A substantial number, but a small percentage, of participants relocated to attend the Career Facilitation Projects.
- About half of the participants worked while attending the project. Almost all of the participants had worked previously, although many had not worked within the past five years.
- The major motivation reported for participating in the Career Facilitation Projects was to develop professional and educational interests. Motivation did not predict whether the participant obtained employment after project termination.
- Most participants anticipated many problems in future employment. Perceptions of job-related problems did not predict whether the participant obtained employment after project termination.

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*Includes figures for all disciplines supported by NSF.

- A comparison of women who completed the projects and those who withdrew* shows that completers were older, had higher family incomes, had older children, and were less likely to be working while participating in the projects. Dropouts often gave the reason for withdrawal as the demanding schedule and reported having more difficulty finding time to study, with transportation, and more often had social science or biology backgrounds. This comparison suggests that the needs of already working women with a lower family income who have small children cannot be easily met within the current program conceptualization.
- There was no significant difference between dropouts and completers in marital status, present school attendance, or present employment.
- Although dropouts and completers were aspiring for the same goals, more completers perceived that they were achieving their goals, i.e., it appears that the Career Facilitation Projects help as many women achieve the goals they have set for themselves.
- Almost 75 percent of the participants have found a job or entered graduate school, and another 20 percent are actively seeking a job.
- The participants having the highest need and availability for employment were the ones who tended to be working after project completion.

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*Several women withdrew to take jobs in science or enter graduate school.

- Although participant satisfaction varied dramatically by project, the participants were generally satisfied with their experience in the Career Facilitation Projects, and many participants reported personal enrichment and group support to be additonal benefits of project participation.
- Most of the employed participants are working in private industry and are making between $10,000-$20,000 annually. Given the minimum investment of $2,000, the participants will repay the cost rapidly in the form of taxes. The program, then, is cost-effective.
- Most of the projects were high quality efforts, directed by dedicated and energetic individuals, and provided adequate and diverse test of the Career Facilitation concept.
- The projects have done an adequate job of updating science skills.*
- Projects having a high participant employment rate were more likely to have some or all of the following:
  -More than a semester of training
  -An internship
  -A focus on retraining rather than updating
  -A focus in engineering or computer science†
  -A larger number of stated employment objectives

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*This was not directly measured, but inferred from graduate school entrance or employment in science-related areas.

†Employment may be delayed in other fields because of additional educational requirements.

- The necessary conditions for project success were:
  - A well developed project plan, including a well defined management structure
  - A strong nontechnical component to meet the unique needs and demands of reentering women such as counseling and job placement
  - A clear goal of knowledge gain
  - A practicum or internship component
  - A well researched projection of the local job market
  - An adequate lead time for selection and recruitment
- Project strategies that appeared to have value were:
  - An introductory conference for recruitment and orientation
  - A problem-solving approach to learning
  - A mix of lecture and self-paced instructional techniques
  - A mix of separate experiences; some classes only for reentry women and some with other students
  - Institutional credit or a degree upon project completion
  - Technical writing course
  - A combination of science departmental and continuing education sponsorship
- Many projects reported having a positive impact on the host institution by sensitizing it to the needs and potential of reentering women scientists.
- There are indications that some of the projects' elements will probably be continued in the absence of NSF funds.

- Economic factors will have the most critical impact on program success. Individual economic factors will influence project participation (a women may decide to reenter the job market on the basis of the cost of the educational transition and the potential economic gain). Economic factors may influence the number of employed project participants. Availability of jobs for graduates will influence participant satisfaction and the future recruitment of participants.
- Another critical factor to program success is the society's view of women's roles and the participant's societal perception of herself, e.g., the changing expectations of and for women increase the demand for the projects.
- The National Science Foundation is providing a unique service not available to the women elsewhere at any cost because of the following facts.
- Although there is a common myth and allusion of available services for this group of women, contacts with over 2,000 relevant agencies/organizations revealed not a single specific refresher course in science that meets all of the needs of reentering women scientists. Most of the existing programs for women in science at the collegiate level are designed to obtain a first bachelor's degree and/or semiprofessional employment.

- Industrial continuing education courses and tuition reimbursement programs are not available to nonemployees. Retraining is available in large companies for the small number of women meeting company qualifications, but most continuing education programs in industry offer seminars in management rather than science.
- No women's resource centers contacted offered programs that meet all of the needs of reentering women scientists.
- There are very few comprehensive nonacademic assistance programs for reentering women. Most of the existing programs are inadequately financed; are not prestigious or even central to host institutions; do not offer direct financial aid to students; and have limited geographic distribution. Many reentering students are not aware of the services that are available.
- The expressed interest in the Career Facilitation Program from a large number of women's resource centers suggest that many would be responsive to the needs of reentering women scientists if they had the resources and information.
- The most critical variable in the decision to hire or not to hire a reentering woman scientist/applicant is her educational credential for the job. Employers are seeking the same attributes in all potential employees and are not adjusting hiring criteria for this group of women scientists.

- Industries that had hired reentering women not trained by the Career Facilitation Programs and that intended to hire more in the future were characterized as more likely to:*
  - Perceive reentering women as having a desire to achieve and as stable and career-oriented.
  - Perceive that industry can help train reentering women.†
- The patterns of hiring behavior suggested that:
  - The companies that predominately hire people with bachelor's degrees want applicants to have job-related experience.
  - The companies who predominately hire people with more than a bachelor's degree do not require job-related experience.
  - The companies who predominately hire people with more than a bachelor's degree are large companies.‡
- The prospects for employment appear to be best in engineering and computer sciences.
- Only one-third of all respondents of an educational institutions survey were aware of the Career Facilitation Program. Engineering deans were the only category of respondents where more had heard of the solicitation than not.

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*Some of the industries interviewed reported hiring reentering women; most of these women, however, either had a recent degree or recent work experience.

(p. 174)

†c.f., Chapter VII which indicates that although they perceive that industry might help retrain the women, they currently offer no training programs. In addition, this perception indicates that non-participating women scientists benefitted from the program.

‡Some of this pattern may indicate an oversampling of firms that hired chemists; e.g., a B.S. in chemistry is not necessarily considered an entry level degree.

- A slight majority of respondents were interested in bidding for a project. Engineering deans* were the only category where more respondents reported that they would not be currently interested in sponsoring the project.
- The most frequently cited reasons for not wanting a project were:
  - -That the student/faculty ratio was high, resulting in overextended faculty and overloaded facilities and resources.
  - -That opportunities for mature women with a B.S. in science to enter existing programs are already available.
- Reasons for being interested in bidding were:
  - -There is a need for this kind of program.
  - -Individual respondents and/or their institution had a strong interest/commitment to educating women.
  - -This kind of program would provide a stimulus for innovation in the institution as a whole.
- Only a small percentage of the respondents felt that being a project director for a Career Facilitation Project would contribute greatly to obtaining tenure. Almost 40 percent felt it would contribute very little to a project director's professional development.

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*Engineering is one of the few educational sectors not facing declining enrollment. This trend in engineering is not predicted to continue.

A summary of the barriers and incentives of each stakeholder group may be seen in Table 12.1.

- The panel concluded that there is a demonstrable need for retraining programs for mature women scientists, and that the Career Facilitation Projects represent an appropriate strategy to meet this need.
- The panel recommended that the most successful of the current projects be continued because they have been effective in meeting the needs of most of the participants.
- The panel recommended that the following issues be further explored within the Career Facilitation paradigm:
  - -Project institutionalization
  - -Participant cost sharing
  - -Characteristics of the host institution
  - -Cooperative arrangements with industry or professional societies
  - -Projects for underemployed women
- The panel recommended continued tracking of project participants to determine long-range project outcomes.
- The panel recommended that additional studies be undertaken to examine women scientists who reenter without the Career Facilitation experience, and an examination of the barriers in the workplace of women scientists.

Conclusions and Program Recommendations

Based on the primary and secondary information gather by DRI and the advice of the panel, DRI concludes the following:

- There is a demand for the program. There is a large number of women who want and need retraining or updating of science skills for whom no other viable alternative exists. This demand may be expected to increase in the forseeable future.
- The Career Facilitation concept is a viable strategy to assist these women, and some projects have been highly successful in assisting the participants to obtain employment or graduate school entrance.
- There are an adequate number of institutions willing and able to sponsor the projects.
- The social climate and employment prospects in engineering and computer science are conducive to project success.
- The projects have been most successful in serving women who are not currently employed, who have adequate incomes, and who do not have small children.
- The successful projects should be continued although the budgets allocated for the projects should not increase dramatically; rather, additional projects should be funded.
- Some relevant questions regarding project implementation have not been addressed or answered. DRI recommends experimentation regarding the following questions concerning the Career Facilitation concept:

  -Will any of the projects be institutionalized?

  -In what format will they be institutionalized?

TABLE 12.1. PAYOFFS FOR GROUPS INVOLVED IN THE CAREER FACILITATION PROJECTS

Group	Incentives and Goals for Participation	Barriers to Participation
NSF/National Policy	To maintain health and quality of science in U.S. To respond to public policy	Absence of large congressional commitment and/or appropriation
NSF/Program Personnel	Visibility to new constituency Knowledge in service delivery to reentry population Funding of unique contribution	Exclusion of other programs High investment per participant Criticism arising from lack of recognition and/or understanding of the reentry women's problems
Sponsoring Institution	Attracting new students Encouragement of innovative teaching methods Demonstration of commitment to women Better community/industrial relationships	Overloading strained faculty and facilities Absence of commitment to to goal Isolated location
Project Directors	Experience in project administration Visibility with industry Personal satisfaction Personal commitment to target population	Absence of professional incentive (few benefits for tenure) Time investment without pay Takes time that might be devoted to activities related to advancement
Participants	New skills/knowledge New/better job Peer support and companionship More self-confidence Absence of science-related alternatives	Demands of heavy schedule Financial demands Transportation demands Family responsibility Role conflict
Employers	New pool of qualified employees New pool of qualified women employees	Financial investment of sponsoring internships Investment of personal time Absence of commitment to goal

-What barriers will be encountered during institutionalization?

-If institutionalized, will they continue to serve the needs of the women?

-How can the structure of the projects be changed to be more responsive to the needs of employed women?

-Is there a way to increase the direct participation of industry and/or professional societies?

-Is there any difference in participant outcome as a function of the prestige of the sponsoring institution?

-What is the appropriate participant selection criterion?

-To what extent should social scientists and biologists be included?

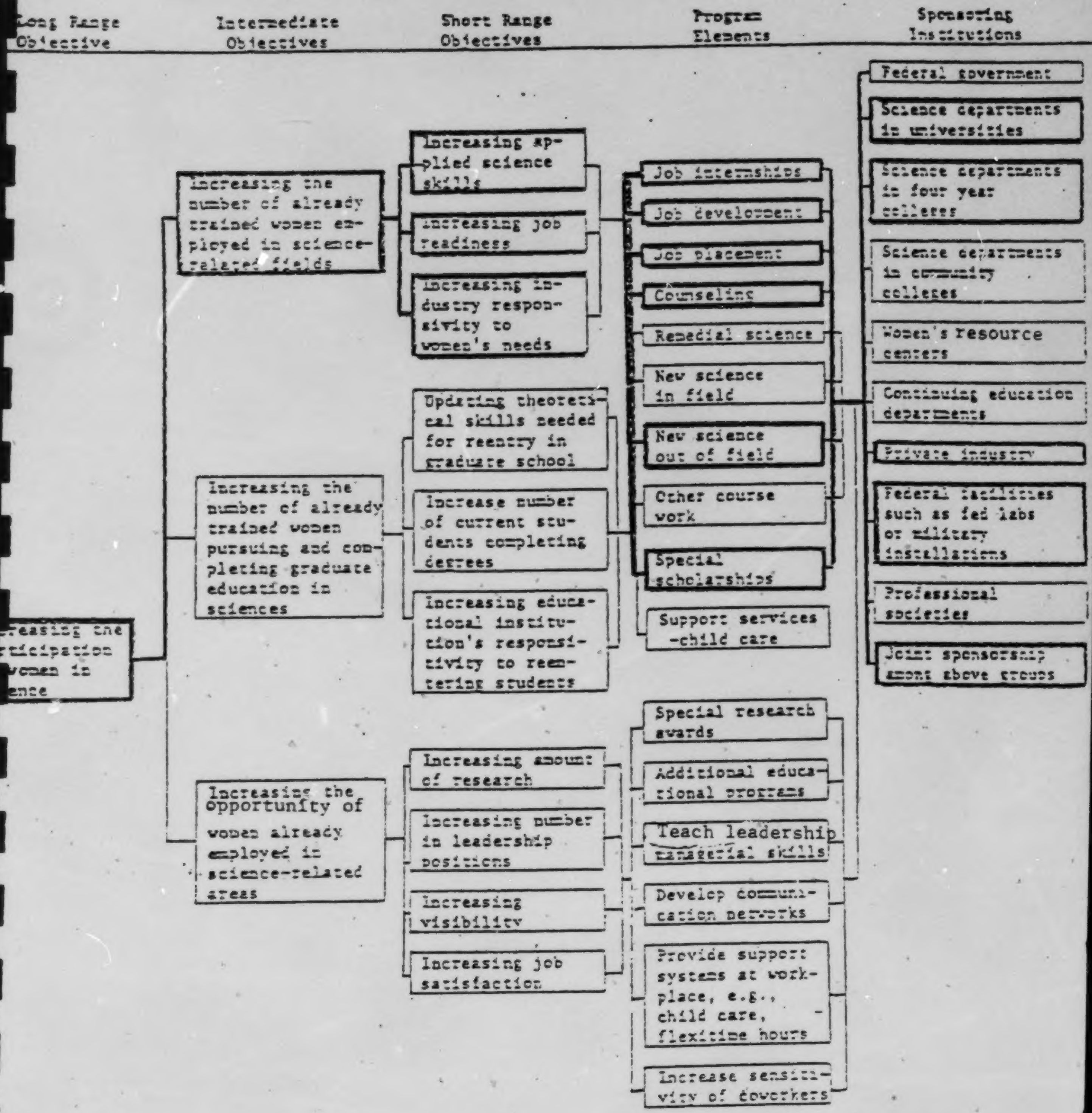
-Should activities aimed at career advancement be included in the projects?

- Experimentation with ways to increase the opportunities for the advancement of already employed women scientists is recommended as a future program emphasis.

DRI recommends four basic models be used in the Career Facilitation Program.

1. The retraining model.. Most of the projects that retrain women scientists as engineers and computer scientists had highly successful employment outcomes. Almost by definition these must be retraining projects because there are so few trained women in these disciplines. The model as illustrated in Figure 12.1 requires maximal science or engineering training, a practicum or internship, and probably would require training of at least a year's duration.

Figure 12.1. Possible Program Strategies to Assist Women with Bachelor's Degrees in Science Retraining Programs


Long Range Objective
Intermediate Objectives
Short Range Objectives
Program Elements
Sponsoring Institutions
...reasing the ...ticipation ...women in ...ence
Increasing the number of already trained women employed in science-related fields
Increasing the number of already trained women pursuing and completing graduate education in sciences
Increasing the opportunity of women already employed in science-related areas
Increasing applied science skills
Increasing job readiness
Increasing industry responsivity to women's needs
Updating theoretical skills needed for reentry in graduate school
Increase number of current students completing degrees
Increasing educational institution's responsitivity to reentering students
Increasing amount of research
Increasing number in leadership positions
Increasing visibility
Increasing job satisfaction
Job internships
Job development
Job placement
Counseling
Remedial science
New science in field
New science out of field
Other course work
Special scholarships
Support services -child care
Special research awards
Additional educational programs
Teach leadership managerial skills
Develop communication networks
Provide support systems at workplace, e.g., child care, flexitime hours
Increase sensitivity of coworkers
Federal government
Science departments in universities
Science departments in four year colleges
Science departments in community colleges
Women's resource centers
Continuing education departments
Private industry
Federal facilities such as fed labs or military installations
Professional societies
Joint sponsorship among above groups

The projects should be required to grant credit to participants and a second degree whenever possible. In addition to a strong academic component, such projects should include vocational information, counseling, referrals, and/or placement. The projects should have close working relationships with industry, and project directors should aggressively attempt to change employers' perceptions of reentry women and develop job opportunities. The aim should be professional positions that offer an opportunity for advancement.

Because of these requirements, the projects will be demanding for participants as well as project directors and will have high costs per participant.

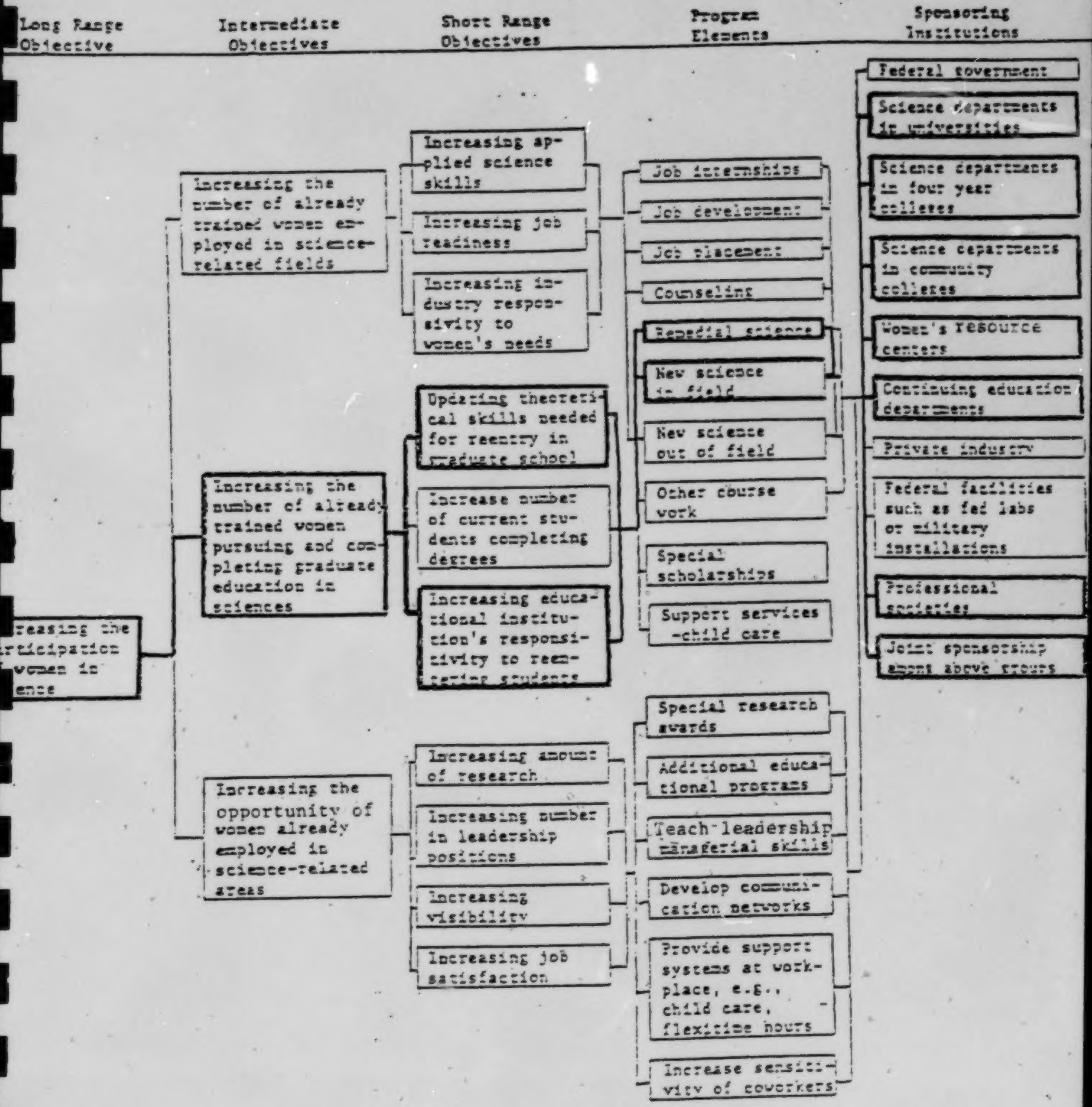
The degree level and background of the participant will have to vary depending on the exact course content offered. The intensive approach implies that the women may have difficulty in holding full-time positions in other fields. This condition precludes the participation of low income women unless financial support in excess of current subsidies was offered. Perhaps middle income participants could contribute to defray the institutional costs and to make more substantial scholarships available. Since the demand for these programs may not be great on the part of males, a strong argument may be made for offering the projects to both sexes.

There are advantages to offering projects on an ongoing basis, e.g., to establish a reentry science center. The most obvious advantage is the substantial lead time needed to obtain university and industrial support is greatly reduced. The best method of encouraging institutionalization is to have a proven record of success, such that industry, the institution, and the participants are willing to contribute to project costs. The participant survey indicated that about one-third of the project completers would have been willing to relocate to participate. The existence of such a center might encourage young women to prepare for reentry problems, a reentry mechanism might encourage more young women to consider science/engineering as a viable career option. Since project funds are limited, it may be advisable to support a small number of "regional" retraining centers and to examine ways to make them self-sustaining in order to increase their numbers.

2. The refresher model. This model illustrated in Figure 12.2 is based on the interest expressed by a large number of women's resource centers, and on the assumption that existing facilities be utilized to update existing skills at little cost to NSF. The model presupposes that it is possible to fund the development of self-paced or independent study refresher courses in given disciplines and to disseminate both the refresher courses and information regarding their availability.

The model has three components: (1) use of women's resource centers as a base for academic, vocational and personal counseling, and peer support; (2) the use of the self-paced updating course material on a fee or tuition basis, with some assistance from faculty members in the science departments; and (3) use of the women's resource center and/or the institution's job placement center for job information and referrals. Because of the strained resources of these facilities, this type of

Figure 12.2. Possible Program Strategies to Assist Women with Bachelor's Degrees in Science Updating Programs


Long Range Objective
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Increase number of current students completing degrees
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Increasing amount of research
Increasing number in leadership positions
Increasing visibility
Increasing job satisfaction
Job internships
Job development
Job placement
Counseling
Remedial science
New science in field
New science out of field
Other course work
Special scholarships
Support services -child care
Special research awards
Additional educational programs
Teach leadership managerial skills
Develop communication networks
Provide support systems at workplace, e.g., child care, flexitime hours
Increase sensitivity of coworkers
Federal government
Science departments in universities
Science departments in four year colleges
Science departments in community colleges
Women's resource centers
Continuing education departments
Private industry
Federal facilities such as fed labs or military installations
Professional societies
Joint sponsorship among above groups

project should be aimed primarily at graduate school admission. This model could easily be adapted to the needs of already working women.

The model assumes that the staff of women's resource centers would be willing to spend time familiarizing themselves with the problems and opportunities for female scientists. Despite their expressed interest, these centers already have limited resources, and such programs would strain resources even further. Most centers have high staff turnover, and there is little communication among center personnel making it impractical to expect extensive outreach to women scientists and/or spinoffs to other centers. Nonetheless, the investment and potential of this model far outweighs its drawbacks.

Since many women's resource centers are grassroots organizations and are at least indifferent to federal agencies, some care must be exercised in working with these centers. By the same token, their potential impact is substantial, often being the first and primary point of contact for community women.

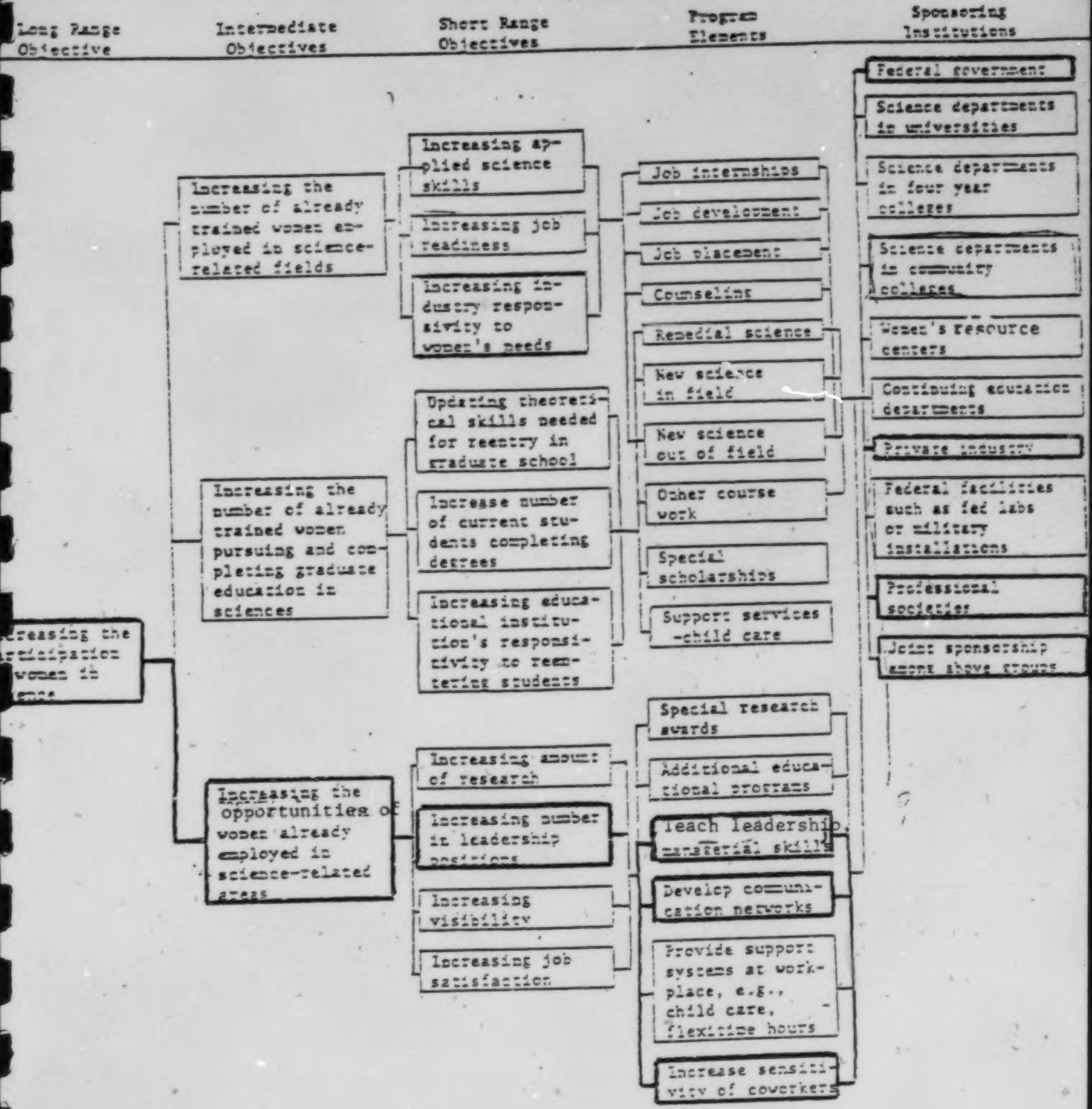
3. The career advancement model. There was a concern on the part of many policy makers and panelists that more emphasis should be placed on career advancement rather than entry level employment. This concern was even greater in areas or disciplines where the prospects for employment are not encouraging. An obligation was felt to provide assistance to those women who have struggled with their careers and who have attempted to be "superwomen" since many of these women are encountering difficulty with advancing in their chosen fields.

Almort no research on this topic was generated by the evaluation report. However, as seen in Figure 12.3, there are many types of programs that might assist this group of women scientists. Many programs involve enhancing additional communications since the communications "network" among women scientists cannot or does not reach the women who need it most. In addition, special opportunities for research and publishing could be designed.

There are three basic categories of programs that might be designed to enhance the opportunities for advancement for already trained women. One category involves increasing the knowledge and skills of the women, such as management seminars or additional opportunities for research and publication. The second category concentrates on the structural barriers to advancement inherent in the workplace, such as employer perceptions and "requirements" for advancement. The third category emphasizes decreasing the logistical, psychological, and experiential barriers to advancement, such as lack of communication and being out of the "network," reluctance to place the demands of work over self and family, and lack of "political savvy."

While trite, the fact is that the problems summarized by each of these categories is partially true. Nonetheless, the core of the problem is probably not knowledge or research experience. Rather, employers perceive that women do not conform to the characteristics expected of upper level management and, in fact, many women do not. Moreover, many women do not wish to conform to this stereotype. More importantly, the workplace does not necessarily require this sterotype

Figure 12.3. Possible Program Strategies to Assist Women with Bachelor's Degrees in Science Career Advancement


Long Range Objective
Intermediate Objectives
Short Range Objectives
Program Elements
Sponsoring Institutions
reasing the rticipation women in
Increasing the number of already trained women employed in science-related fields
Increasing the number of already trained women pursuing and completing graduate education in sciences
Increasing the opportunities of women already employed in science-related areas
Increasing applied science skills
Increasing job readiness
Increasing industry responsivity to women's needs
Updating theoretical skills needed for reentry in graduate school
Increase number of current students completing degrees
Increasing educational institution's responsivity to reentering students
Increasing amount of research
Increasing number in leadership positions
Increasing visibility
Increasing job satisfaction
Job internships
Job development
Job placement
Counseling
Remedial science
New science in field
New science out of field
Other course work
Special scholarships
Support services -child care
Special research awards
Additional educational programs
Teach leadership, managerial skills
Develop communication networks
Provide support systems at workplace, e.g., child care, flexitime hours
Increase sensitivity of coworkers
Federal government
Science departments in universities
Science departments in four year colleges
Science departments in community colleges
Women's resource centers
Continuing education departments
Private industry
Federal facilities such as fed labs or military installations
Professional societies
Joint sponsorship among above groups

> old American notion that money and time is best spent making the person (p. 262).

The second model is the "discrimination" model, in which men as individuals are blamed for discrimination and oppression. Kanter comments on programs designed on the discrimination model:

> The equivalent of self-improvement programs for women are "self-examination" programs for men in organizations, in which their sexism and ignorance about women is unmasked. This strategy, too, is doubtful as an effective change technique, even though some men undeniably gain insights into their behavior that can affect the ways they treat the women close to them. As a political tactic alone, questions can be raised. Such approaches are likely to arouse great resistance among men and antagonize those who may be allies (p. 263).

Kanter concludes that an alternative model which demonstrates that responses to work are a function of basic structural issues, such as the constraints imposed by roles and the effects of opportunity, power and numbers, must be applied. This model would require that organizations--not people--must be the focus of change.

The potentially most effective programs must involve women and their employers simultaneously to have any hope of producing structural change. Such programs cannot easily address the structural issues; structural change can only be rapidly accomplished by legislative or policy means. While it is naive to assume that placing these two groups in the same room would necessarily result in increased communication and understanding, the potential is considerable. If a program could achieve

(1) increased understanding by employers of the value of women employees and their problems, (2) increased understanding by the women of current expectations of management, and (3) the creation of a personal network system involving both men and women, then long-range change and increased flexibility from both parties might occur.

In general, such "attitude" change programs are frequently more effective when oriented around another task, such as training, employee satisfaction, or innovation in the work place. A program specifically designed to create "understanding" may not appeal to management, although a number of industries report engaging in them.

In sum, programs to increase the opportunities for advancement of women scientists should include at least the following elements: Recognition, identification, and elimination of barriers in the workplace, alteration of management's perceptions of the potential contribution of women employees, increases in the understanding by women of what employers want and need in upper level managers, and the creation of personal communication networks for the women scientists.

One obvious route to accomplishing these aims is to utilize the existing Career Facilitation projects. Most of these projects utilize both female scientists as role models and industrial representatives. It may be fruitful to expand this function so that both groups and the project participants have sustained interaction for a period of time as a part of training the project participants.*

Model IV--Prevention. The major area not covered in the foregoing recommendations is prevention of the problem of scientific obsolescence.

---

*The University of Dayton has conducted extensive workshops that included many role model/lectures from the Career Facilitation Project.

While prevention activities are not currently in vogue, it seems desirable to address the problem, since it is not likely to be mitigated in the current economic climate where part-time jobs will not be readily available. It seems appropriate to attempt to prepare women to use the period during career breaks to their best advantage, and to maintain professional friendships, memberships, and reading habits. Special sections of maintaining professional identity could be incorporated in course work for senior science majors.

An obsolescence prevention course assumes that more is known about scientific obsolescence than is warranted. For example, there is no definite criterion of what causes obselescence, i.e., is the absence of theoretical or applied knowledge the major cause of obsolescence, or is it a knowledge much more nebulous involving current trends and hypotheses? Further, as the "epidemiology" of obsolescence is unclear, knowledge about the activities that can best prevent it is equally speculative. Finally, prevention programs are notoriously ineffective. Nonetheless, given the large number of women scientists who have and who will face this problem, exploration into preventive methods is a critical activity.

Appendix A

PROGRAMS FOR REENTRY WOMEN SCIENTISTS

NSF Efforts to Expand Science Career Opportunities for Women

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Program Manager, Women in Science
Division of Scientific Personnel Improvement
Directorate for Science Education
National Science Foundation

Presented at 26th National Convention
of the
National Science Teachers Association

Session on
How Science Career Opportunities Can Be Expanded

Board Room
Shoreham Americana Hotel
Washington, D.C.
April 7, 1978

For multiple and complex reasons, only a small number of qualified women pursue careers in science, mathematics, and engineering. In 1974 and 1975, the National Science Foundation, through its Office of Experimental Projects and Programs, made awards for a series of studies and educational experiments designed to provide further understanding of this situation and to test possible solutions. One of those who received an award in 1974 was Walter S. Smith, then Associate Dean of Women at the University of Kansas. The publication, on which Dr. Smith is to speak later in this session, was an outcome of that grant.

In 1976, the unofficial NSF Women in Science Program became official by virtue of that year's congressional authorization. Specifically, the Congress directed the Foundation "to develop and test methods of increasing the flow of women into careers in science." While the authorization act gave no prescriptions on how this was to be accomplished, the message we got was to become more action oriented. To develop a program plan the staff of the Science Education Directorate worked with the Committee on Minorities and Women in Science of the National Science Board, which is the policy-making body of the Foundation. According to the plan developed and approved by the full Board, the Women in Science Program was to direct its efforts to three target audiences: high school students, college and university students, and women with degrees in science who were not in science or were underemployed in terms of their original education.

Awards were made in 1976 and 1977 that were directed to two of these target audiences, college and university students and women with degrees. During that two-year period, a total of 46 grants were awarded to colleges and universities to carry out one- or two-day, multidisciplinary Science Career Workshops for women undergraduate and graduate students in order to provide them with information and practical advice regarding science careers. These Workshops were at three different educational levels: Freshman-Sophomore, Junior-Senior, and Graduate. Naturally, the types of information and advice provided differed for the three levels.

We believe the Workshops are accomplishing much of what we hoped for. Not only are the student participants obtaining an increase in knowledge about science careers, they are being motivated by women scientist role models who participate in the Workshops as speakers and panelists. There are also some interesting side effects. Male faculty who participate in or observe the Workshops are sensitized to the problems women have in entering traditionally male fields; women faculty in different science departments are getting to know each other better; and many grantee institutions are planning ongoing programs to provide science career information.

The other type of individual affected by grants made in 1976 and 1977 is the woman with the unused science degree. Twenty-one awards--11 in 1976 and 10 in 1977—were made to colleges and universities for

Science Career Facilitation Projects, designed to update and augment the scientific knowledge obtained by women who received bachelor's or master's degrees in science at least two years before their acceptance as participants in the projects. The objective was to bring the participants to the point where they were eligible to enter graduate school or to obtain scientific employment immediately.

These projects consist of specially designed courses, independent study, research participation, internships in industrial or governmental laboratories, or combinations of such activities. Existing courses have also been used to a limited extent in some projects. The term of participation varies from project to project, but is expected not to exceed 12 months. Participants are selected by the grantee institutions.

Since we did not wish to train or retrain women in fields in which they were already fairly well represented or in which jobs are not in good supply, we required proposers to give evidence that the field in which the training was proposed is characterized by greater than usual underrepresentation of women and by good opportunities for employment. The result has been the funding of projects primarily in chemistry, engineering, computer science, or interdisciplinary problem-oriented fields. Of the 21 projects supported in 1976 and 1977, seven have been in chemistry-related fields, six in engineering, three in computer science or applied mathematics, three in interdisciplinary fields, and two in the life sciences. Even within the chemistry-related fields, there is some specialization, since two of the six are in polymer science and one in industrial chemistry.

The Science Career Facilitation Projects have been of three main types. In the first type, participants are simply updated in their original fields. In the second type, they are converted from one field to another, for example, from chemistry to chemical engineering or from physics to electrical engineering. In the third type, they are updated in their original fields but given additional training in a new field, so that they have the equivalent of a special interdisciplinary degree. In one project, for example, refresher work in a participant's original science field was combined with intensive instruction in computer science. The aim was to provide two possible directions for the participants. They could either enter the job market as professional computer specialists in basic discipline areas or enter a computer science graduate program.

If any of you are interested in obtaining additional information about the Facilitation Projects, you might wish to request a report on the assessment of the 11 projects funded in 1976. This report, which is entitled On-Site Assessment of the Women in Science Career Facilitation Program, was prepared by two NSF evaluators, Dr. Conrad Katzenmeyer and Dr. Frances Lawrenz. It is available from the Office of Program Integration, Directorate for Science Education, National Science Foundation, Washington, D. C. 20550.

Efforts directed to high school students began in 1977 with the award of a contract to Research Triangle Institute to plan a Visiting Women Scientists Program. RTI is currently implementing this plan by conducting a pilot program in which 30 women scientists are visiting approximately 120 high schools throughout the nation. The activities of the visitors vary from school to school, but include such things as presentations to assemblies and classes and small-group meetings with students, teachers, and counselors. Assistance is also being given to the schools in obtaining career materials, such as pamphlets, films, and bibliographies.

The pilot effort is being evaluated in order to determine whether NSF should provide continuing support for a Visiting Women Scientists Program. We hope the evaluation will provide answers to three major questions: (1) Are high schools interested in such a program? (2) Is the program feasible for operation on a national basis with a variety of types of schools? (3) Is the program effective in encouraging girls to consider careers in science? We don't have the answers to these questions yet, but we have learned that there is no difficulty in getting women scientists to serve as visitors. We needed only 30 visitors for the pilot program, but over 600 women volunteered. It is certainly pleasing to know that women scientists are willing to take the time from their busy schedules to help the next generation make important career decisions that will affect the rest of their lives.

We are now well into the third year of the Women in Science Program. The budget is at about the same level as that of the two previous years, namely, one million dollars. In addition to the support for the pilot Visiting Women Scientists Program, we expect to make awards for about 25 additional Science Career Workshops and to make renewal grants to about six of the Science Career Facilitation Projects funded in 1976. There is one minor modification this year in the Workshops component of the Program. In addition to those for undergraduate and graduate students, we plan to support a few for women who have a bachelor's degree in science, but are presently neither in graduate school nor employed in scientific jobs commensurate with their education and experience.

There is not sufficient time to talk about how the other programs of the NSF Science Education Directorate are expanding science career opportunities for women. But we are expecting them to play an increasing role. In 1979, for example, the Foundation is planning a major thrust at the junior high school level across all the Divisions of the Science Education Directorate. This could be especially important for girls, since it is at this level that they often make decisions to drop out of mathematics and science, thereby closing many doors in their future.

I wish I could say something definitive about the future of the Women in Science Program. But activities in 1979 and beyond depend on many factors, such as the results of various evaluations and needs assessments, reorganizations--both internal and external—and, of course, actions of the Congress.

I would be happy to answer any questions you may have.

Status of the National Science Foundation Women in Science Career Facilitation Program

In fiscal years 1976 and 1977 NSF, under its Women in Science Program, made a total of 21 grants for Science Career Facilitation Projects. These projects are designed to update and augment the scientific knowledge obtained by women who received science degrees at least two years before their acceptance as participants in the projects. The objective was to bring the participants to the point where they were eligible to enter graduate school or to obtain scientific employment immediately.

These projects consist of specially designed courses, independent study, research participation, internships in industrial or governmental laboratories, or combinations of such activities. Existing courses have also been used to a limited extent in some projects. The term of participation varies from project to project, but generally does not exceed 12 months. Participants are selected by the grantee institutions.

Since NSF did not wish to train or retrain women in fields in which they were already fairly well represented or in which jobs are not in good supply, proposers were required to give evidence that the field in which the training was proposed is characterized by greater than usual underrepresentation of women and by good opportunities for employment. The result has been the funding of projects primarily in chemistry, engineering, computer science, or interdisciplinary problem-oriented fields. Of the 21 projects supported in 1976 and 1977, seven have been in chemistry-related fields, six in engineering, three in computer science or applied mathematics, three in interdisciplinary fields, and two in the life sciences. Even within the chemistry-related fields, there has been some specialization, since two of the six are in polymer science and one in industrial chemistry.

Science Career Facilitation Projects have been of three main types. In the first type, participants are simply updated in their original fields. In the second type, they are converted from one field to another, for example, from chemistry to chemical engineering or from physics to electrical engineering. In the third type, they are updated in their original fields but given additional training in a new field, so that they have the equivalent of a special interdisciplinary degree. In one project, for example, refresher work in a participant's original science field was combined with intensive instruction in computer science. The aim was to provide two possible directions for the participants. They could either enter the job market as professional computer specialists in basic discipline areas or enter a computer science graduate program.

Because of the experimental nature of the Science Career Facilitation Program, NSF decided to evaluate it before accepting additional proposals for new projects. This evaluation is now being carried out by the Denver Research Institute. However, NSF did make renewal awards in 1978 to six of the eleven projects funded in 1976, and expects to make about the same number of renewals in 1979 to projects funded in 1977. By taking advantage of the knowledge and experience gained by these institutions in carrying out their original ideas and enabling them to improve their efforts, NSF hopes to identify some of the factors that lead to successful career facilitation projects. It also expects that the additional funding will result in some institutionalization of the activities carried out under the grants.

The future of the Science Career Facilitation Program depends on a number of factors, including the results of the evaluation study and the funds available to the Women in Science Program. It is hoped that a decision regarding the Program can be made by the summer of 1979.

Attachment: List of Grants

December 1978

State/Institution Address	Year of Award	Project Director Department	Field of Training
CALIFORNIA			
Univ. of California Davis 95616	1976 and 1978	Richard C. Dorf Dean, Division of Extended Learning	Electrical Engineering
California St. Univ. Northridge 91324	1977	Bonita J. Campbell Engineering and Computer Science	Engineering
Mount St. Mary's Coll. Los Angeles 90049	1977	Sister Annette Bower Biological Sciences	Biochemistry Physiology
DISTRICT OF COLUMBIA			
American University Washington 20016	1976 and 1978	Nina M. Roscher Assoc. Prof. of Chemistry and Assoc. Dean for Grad. Affairs and Research	Chemistry
ILLINOIS			
Southern Illinois Univ. Edwardsville 62025	1977	Charlotte O. Lee Chemistry	Chemistry
INDIANA			
Univ. of Notre Dame Notre Dame 46556	1976	Lloyd H. Ketchum, Jr. Civil Engineering	Environ. Health Engineering
MASSACHUSETTS			
Univ. of Lowell Lowell 01854	1976 and 1978	Rita Blattberg-Blumstein Chemistry	Polymer Science
Mount Holyoke Coll. South Hadley 01075	1977	Edwin S. Weaver Chemistry	Chemistry
MINNESOTA			
Coll. of St. Catherine St. Paul 55105	1976	Sr. Mary Thompson Chemistry	Chemistry
MISSISSIPPI			
Alcorn State Univ. Lorman 39096	1977	Ruth M. Brady Chemistry and Physics	Interdisciplinary
NEW YORK			
Polytechnic Inst. of NY Brooklyn 11201	1976 and 1978	Bernard J. Bulkin Dean of Arts and Sciences	Polymer Science and Engineering

State/Institution Address	Year of Award	Project Director Department	Field of Training
NEW YORK (cont'd)			
CUNY Graduate School New York 10036	1977	Deanna Chitayat Center for Advanced Study in Education	Computer Science
State Univ. of NY Stony Brook 11790	1977	Patrick J. Herley Materials Science	Engineering
OHIO			
Univ. of Dayton Dayton 45409	1976 and 1978	Carol M. Shaw Assoc. Prof. and Asst. Dean of Engineering	Electrical and Chemical Engr.
PENNSYLVANIA			
Chestnut Hill Coll. Philadelphia 19118	1976	Sr. Mary Kieran McElroy Chemistry	Interdisciplinary
Chatham College Pittsburgh	1977	Diane K. Wakefield Chemistry	Chemistry
TEXAS			
Univ. of Texas Austin 78712	1976 and 1978	Nell B. Dale Computer Sciences	Interdisciplinary (Computer science combined with original disciplines of participants)
Univ. of Houston * Houston 77004	1977	Gerhard F. Paskusz Electrical Engineering	Engineering
Univ. of Texas Arlington 76010	1977	Ann Benham Chemistry	Interdisciplinary
VIRGINIA			
George Mason Univ. Fairfax 22030	1976	Natalia Meshkov Physics	Interdisciplinary
WASHINGTON			
Washington State Univ. Pullman 99163	1976	Calvin T. Long Pure and Applied Mathematics	Mathematics

* Terminated before completion of project

Appendix B

PARTICIPANTS QUESTIONNAIRE

CAREER FACILITATION PROJECT QUESTIONNAIRE

1. Name ____

   Address ____

   ____

2. Date of Birth: ________________________________
   Month Day Year

3. Sex: 1( ) Male 2( ) Female

4. Are you a United States citizen? 1( ) Yes 2( ) No

   IF NO:
   What is your Visa Status? ________________________________

5. What is your current Women in Science Career Facilitation Program status?

   1( ) Completed the program
   2( ) Participated in the program but did not complete it

   -- If you did not complete the program, why not?

   a( ) Schedule of program too demanding
   b( ) Too difficult to return to school environment
   c( ) Interfered with family life
   d( ) Did not offer what I wanted
   e( ) Had to relocate
   f( ) Financial difficulty
   g( ) Inappropriate curriculum to meet my needs
   h( ) Other ________________________________
   WRITE IN

   3( ) Currently in the program
   4( ) Applied for the program but did not participate
   5( ) Inquired about the program
   ( ) Other ________________________________
   WRITE IN

6. What type of degree did you have before you applied for the Career Facilitation Program? Check all that apply.

   1( ) Associates (A.A./A.S.)
   2( ) Bachelor's (B.A./B.S.)
   3( ) Master's (M.A./M.S.)
   4( ) Doctorate (Ed.D./Ph.D.)
   5( ) Professional Degree (M.D., J.D., D.D.O., etc.)

7. Where did you get your degree(s)?

Degree	Institution	Major	Year

8. If you have participated in any other formal educational programs that did not result in a degree, how many courses did you take? ________________
   0( ) None

   IF TOOK COURSES:
   Please list below the last three courses, the institution and year you took them.

Courses	Institution	Year

231

9a. How many years have you worked since earning your Bachelor's Degree?__________years

9b. How many of these years have been spent working in a job related to your Bachelor's Degree?__________years

9c. If you have worked in a job not related to your degree, why?

1( ) Lack of available jobs related to my degree when I was job hunting
2( ) Fear of having forgotten most of what I knew
3( ) Lack of knowledge of what careers were available to me
4( ) Had general science background (not specific skills)
5( ) Lived in a small city with few available jobs
6( ) Not particularly interested in attaining degree-related job
( ) Other______________________________
WRITE IN

10. Are you currently employed?
1( ) Yes (INCLUDE GRADUATE RESEARCH ASSISTANTSHIPS AND OTHER FELLOWSHIPS)
2( ) No (SKIP TO Q. 20)

IF YES:
To what degree did the Career Facilitation Program help you get this job?

1( ) Very much
2( ) A little
3( ) Not at all

11. Are you employed full-time or part-time?

1( ) Full-time
2( ) Part-time
3( ) Both

12. If you have full-time paid employment, what is it?________________________

13. If you have part-time paid employment, what is it?________________________

14. Are you employed by:

1( ) The Federal Government
2( ) The State Government
3( ) Local Government
4( ) Private business or industry
5( ) Self-employed
6( ) College or University
( ) Other______________________________
WRITE IN

15. How long have you worked at your current job?

1( ) Less than a year
2( ) 1 to 3 years
3( ) 3 to 5 years
4( ) Over 5 years

16. What is your current income? (Include only your earnings from your employment)

1( ) Less than $10,000 per year
2( ) $10,000 to $20,000 per year
3( ) $20,000 to $30,000 per year
4( ) $30,000 to $40,000 per year
5( ) Over $40,000 per year

17. To what degree did the availability of transportation impact upon your employment opportunities?

1( ) Very much
2( ) Somewhat
3( ) A little
4( ) Not at all

18. How long does it normally take to commute to your place of employment?

1( ) Zero to 10 minutes
2( ) 10 to 20 minutes
3( ) 20 to 30 minutes
4( ) 30 to 40 minutes
5( ) 40 to 50 minutes
6( ) 50 to 60 minutes
7( ) Over an hour

19. How do you get to work?

1( ) Family car/own car
2( ) Carpool
3( ) Public transportation
4( ) Walk
( ) Other______________________________
WRITE IN

SKIP TO QUESTION 25.

20. How long has it been since you were employed?

1( ) Less than 1 year
2( ) 1 to 5 years
3( ) 6 to 10 years
4( ) More than 10 years
5( ) Have never worked

21. Why did you leave your last job or if you have never worked, why not?

1( ) Quit last job to enter Career Facilitation Program
2( ) Didn't have the skills necessary
3( ) Pregnancy
4( ) Family obligations
5( ) To return to school
6( ) Fires/laid off
7( ) Medical problems
8( ) Transportation problems
9( ) Company moved
10( ) Family moved
11( ) Salary too low to be worthwhile
( ) Other______________________________
WRITE IN

22. If you have worked, what was your last job?______________________________

23. Do you plan to enter or return to the labor force? 1( ) Yes 2( ) No

IF YES:
Do you plan to work full-time or part-time? 1( ) Full-time 2( ) Part-time

24. What efforts have you made to find a job?

1( ) Contacted Bureau of Employment Security
2( ) Sent out resumes
3( ) Interviewed with recruiters/personnel officers
4( ) Talked to job placement counselors
5( ) Registered with employment agencies
6( ) Read Want Ads regularly
7( ) Talked with friends
( ) Other______________________________
WRITE IN

25. Are you currently attending any type of school or college? (Other than the Career Facilitation Program)

1( ) Yes, please specify: ____________________
2( ) No
3( ) No, but intend to in future

IF YES:
How many hours per week do you attend? ____________________

IF NO, BUT INTEND TO IN FUTURE:
How many hours per week would you like to attend? ____________________

26. Marital Status:

1( ) Single, never married (SKIP TO Q. 32)
2( ) Separated, divorced, widowed
3( ) Married

27. Spouse's occupation is/was:

1( ) In a field closely related to mine
2( ) In a field somewhat related to mine
3( ) In an unrelated field

28. What is/was your total family income? (Include your earnings and your spouse's earnings for the most recent year you were married)

1( ) Less than $[illegible],000 per year
2( ) $10,000 to $20,000 per year
3( ) $20,000 to $30,000 per year
4( ) $30,000 to $40,000 per year
5( ) Over $40,000 per year

IF YOU ARE NOT CURRENTLY MARRIED, SKIP TO QUESTION 32.

29. To what degree did availability of transportation impact upon your spouse's employment opportunities?

1( ) Very much
2( ) Somewhat
3( ) A little
4( ) Not at all

30. How long does it normally take him to commute to his place of employment?

1( ) Zero to 10 minutes
2( ) 10 to 20 minutes
3( ) 20 to 30 minutes
4( ) 30 to 40 minutes
5( ) 40 to 50 minutes
6( ) 50 to 60 minutes
7( ) Over an hour

31. How does your spouse get to his place of employment?

1( ) The family car/own car
2( ) Carpool
3( ) Public transportation
4( ) Walk
( ) Other ____________________
WRITE IN

32. How many children do you have responsibility for who are:

Under 6 years of age? ____________________

6 to 12 years of age? ____________________

Over 12 years of age? ____________________

33. Women give various reasons for wanting to work. Please read each statement below and check how important or unimportant the reason is to you personally--is it very important, somewhat important, neither important nor unimportant, somewhat unimportant, or very unimportant to you personally.

		Important			Unimportant	
		Very	Somewhat	Neither	Somewhat	Very
a.	To make a living.	1( )	2( )	3( )	4( )	5( )
b.	To gain recognition and status.	1( )	2( )	3( )	4( )	5( )
c.	To make good friends.	1( )	2( )	3( )	4( )	5( )
d.	To use my hobbies or interests.	1( )	2( )	3( )	4( )	5( )
e.	To serve my community	1( )	2( )	3( )	4( )	5( )
f.	To be a member of a team. . . .	1( )	2( )	3( )	4( )	5( )
g.	To develop my potential	1( )	2( )	3( )	4( )	5( )
h.	To get good benefits.	1( )	2( )	3( )	4( )	5( )
i.	To use my education	1( )	2( )	3( )	4( )	5( )
j.	To meet interesting people. . .	1( )	2( )	3( )	4( )	5( )
k.	To travel	1( )	2( )	3( )	4( )	5( )
l.	To avoid staying home	1( )	2( )	3( )	4( )	5( )
m.	To avoid housework.	1( )	2( )	3( )	4( )	5( )
n.	To pay for my children's education.	1( )	2( )	3( )	4( )	5( )
o.	To participate in activities that are exciting	1( )	2( )	3( )	4( )	5( )
p.	To learn as much as I can . . .	1( )	2( )	3( )	4( )	5( )
q.	To earn extra family income . .	1( )	2( )	3( )	4( )	5( )

34. How likely or unlikely do you think the following things are to occur for women who work?

		Likely			Unlikely	
		Very	Somewhat	Neither	Somewhat	Very
a.	Takes too much time away from your family	1( )	2( )	3( )	4( )	5( )
b.	Good opportunity for promotions	1( )	2( )	3( )	4( )	5( )
c.	Takes too much time away from your personal and social activities.	1( )	2( )	3( )	4( )	5( )
d.	Have bosses who hassle or harrass you	1( )	2( )	3( )	4( )	5( )
e.	Good opportunity to keep your skills up-to-date	1( )	2( )	3( )	4( )	5( )
f.	Makes you independent of family	1( )	2( )	3( )	4( )	5( )
g.	Have trouble finding dependable people to take care of your children.	1( )	2( )	3( )	4( )	5( )
h.	Success on job causes others to dislike you	1( )	2( )	3( )	4( )	5( )
i.	Have trouble with your family accepting your work	1( )	2( )	3( )	4( )	5( )
j.	Have transportation problems getting to and from work. . . .	1( )	2( )	3( )	4( )	5( )
k.	Have trouble doing what's expected of you at work	1( )	2( )	3( )	4( )	5( )
l.	Have trouble keeping up with other workers	1( )	2( )	3( )	4( )	5( )

35. How did you hear about the Career Facilitation Program?

1( ) Friend
2( ) Alumni News
3( ) Newspaper article
4( ) Newspaper advertisement
5( ) Radio
6( ) Magazine
7( ) School bulletin board
8( ) Contacted by program directly
( ) Other____________________
WRITE IN

IF YOU ARE NOT PRESENTLY PARTICIPATING IN A CAREER FACILITATION PROGRAM AND HAVE NEVER PARTICIPATED IN A CAREER FACILITATION PROGRAM, PLEASE STOP HERE AND PUT THE QUESTIONNAIRE IN THE RETURN ENVELOPE ENCLOSED. THANK YOU FOR YOUR ASSISTANCE.

IF YOU ARE PARTICIPATING IN A CAREER FACILITATION PROGRAM OR HAVE IN THE PAST, PLEASE CONTINUE WITH THIS QUESTIONNAIRE.

36. When you were thinking about applying to the Career Facilitation Program, did you also consider a degree program, i.e., a regular college/university program offering a B.S., M.S., or Ph.D.?

1( ) Yes 2( ) No

IF YES:
What?____________________

37. Did you consider any other type of program or activity to prepare you for work?

1( ) Yes 2( ) No

IF YES:
What?____________________

38. Which of the following problems did you have to deal with when you entered the Career Facilitation Program?

1( ) Child care problems
2( ) Problems arranging family obligations so that you could enter
3( ) Family resistance to your attending the program
4( ) Anxiety about your ability to successfully cope with the university/college environment
5( ) Finding time to study
6( ) Commuting/transportation problems
7( ) Relocation problems
( ) Other____________________
WRITE IN

39. Did you have outside employment while attending the program? 1( ) Yes 2( )No

IF YES:
Did you work full- or part-time? 1( ) Full-time 2( ) Part-time

IF YES:
What type of work did you do?____________________

40. Did you have to relocate to participate in the program? 1( ) Yes 2( ) No

41. Would you be willing to relocate to participate in the program? 1( ) Yes 2( ) No

42. Would you be willing to relocate for a job? 1( ) Yes 2( ) No

43. Were you fearful of your own ability to handle the math and science courses that were part of the program?
1( ) Yes 2( ) No

44. **Would you have participated in the Career Facilitation Program if you had to pay tuition?**

1( ) Yes 2( ) No

IF NO:
Why not?

1( ) Couldn't afford it
2( ) Not worth it
3( ) My family would object to the expenditure
( ) Other____
WRITE IN

45. Would you have taken out a loan to pay for your participation in the Career Facilitation Program if the program had charged tuition and had offered to provide loans?

1( ) Yes 2( ) No

IF NO:
Why wouldn't you take out a loan?

1( ) Couldn't afford it
2( ) Not worth it
3( ) My family would object to the loan
( ) Other____
WRITE IN

46. Below are listed various aspects of the Career Facilitation Programs. Please rate each aspect.

	Excellant	Good	Fair	Poor	Not Available
a. Project Director.	1( )	2( )	3( )	4( )	5( )
b. Project Staff	1( )	2( )	3( )	4( )	5( )
c. Curriculum Content.	1( )	2( )	3( )	4( )	5( )
d. Presentation of Curriculum.	1( )	2( )	3( )	4( )	5( )
e. Organization of Curriculum.	1( )	2( )	3( )	4( )	5( )
f. Career Counseling	1( )	2( )	3( )	4( )	5( )
g. Job Placement Services.	1( )	2( )	3( )	4( )	5( )
h. Personal Counseling	1( )	2( )	3( )	4( )	5( )
i. Child Care Services	1( )	2( )	3( )	4( )	5( )

47. What did you expect to achieve as a result of the Career Facilitation Program?

____

48. Did you achieve it? Or, if presently participating, do you think you will?

1( ) Yes 2( ) No

IF NO:
Why not?____

49. Were you expecting to earn an advanced degree? 1( ) Yes 2( ) No

50. Please give us your thoughts or comments on the program.

Appendix C

SYNOPSIS OF 1977 CAREER FACILITATION PROJECTS

This appendix contains a synopsis of the 1977 projects. The form and content is designed to be similar to the briefs of the 1976 projects published by NSF as "An On-Site Assessment of the Career Facilitation Projects." Each synopsis contains an outline of the goals, procedures and expected outcomes as described in the proposals, a description of the implemented projects, and the participants responses, and gives some brief evaluation and recommendation. These more recent projects are described less thoroughly by the chapter on participant outcomes, since most are still in progress.

MOUNT SAINT MARY'S COLLEGE

Los Angeles, California

Project Director:	Sister Annette Bower, Chair, Department of Biological Sciences
Project Name:	Women in Science
Emphasis:	Update in biochemistry research
Duration:	3 semesters (1½ calendar years)

Proposed Project

The Women in Science Career Facilitation project at Mount St. Mary's College was planned as a three-semester project, using a combination of self-paced learning units and modular course work. The last semester was to include a six-week internship, with placement assistance to be given in the summer following the end of formal course work and internship.

Twenty participants were to be chosen, with the possibility of an extra 15 to be admitted a year later. The project was to begin with an orientation week to help the participants in self-assessment and career planning.

The participants' first semester is to be spent in a modular instrumentation course and self-paced learning in scientific information retrieval. The participants will also have the option of enrolling in regular course work. After a summer break, the second semester was to commence with a core modular course in cellular physiology and biochemistry. Self-paced learning is to continue as individual needs require, and participants are to engage in active participation in ongoing campus research projects. Throughout the first two semesters, biweekly seminars are to be held on selected biochemical topics. The final semester is to include an internship with a professional woman working in a science-related field, and a modular course in computer use and biostatistics.

The project planned to include counseling and support services. These services are to begin with the orientation week, and continue with career planning activities, auxiliary skill training (study skills, assertiveness training), employment and graduate school presentations, presentations by professional women in scientific positions, and job search skills workshops. At the end of the course work, active assistance was to be provided in job placement.

Rationale Assumptions and Expected Outcomes

The California Manpower estimate shows a demand for biochemical research workers through 1980, an estimate confirmed by several major scientific employers in the Los Angeles area. The project staff also discussed the project with professional women employed by the major scientific employers, who assured them that the time is appropriate for "upward mobility" of trained and educated women.

In order to prepare the women to enter the labor market as well as receive promotions, assertiveness training skills were to be stressed.

Mt. St. Mary's College has a substantial continuing education program whose resources will be available to the participants.

Implemented Project

Publicity for the project was composed mainly of periodical advertisements and feature stories, and a brochure was printed and distributed. The advertising resulted in 150 inquiries and 58 completed applications from which 20 participants and five alternates were selected. Four early withdrawals were replaced from the alternate list.

Only one day of formal orientation was held, and included staff introductions, campus tour, and counseling activities. Class was held for three hours, two days a weeks, with self-paced work and individual counseling done in the participants' free time.

The counseling activities began slowly and at this stage the project director reports that many participants are still in need of a large amount of one-to-one "guidance, reassurance, and direction," and that increased counseling activities will be provided. The participants responded well to the self-paced media assignments, although the project staff was concerned over the participants perceived need to "memorize every bit of the media presentations."

One problem with the flexible scheduling was that many participants worked part-time, so "hands on" instrumental experience was not permitted in the quantity the participants needed. Consequently, the research fall projects emphasized instrumentation.

Project Staff, Management and Organization

The project director, Sister Annette Bower, is the chair of the Department of Biological Sciences at Mount Saint Mary's. She and the other project staff in the sciences have active ongoing research projects, which participants will assist with in the fall semester. The college has a tradition of student assistance in faculty research. Several of the project staff are married women with children; all of the staff as professional women should be able to provide supportive guidance and role modeling.

The evaluation plan includes both informal formative evaluation, and follow-up of the participants' progress post-project. The participants will respond at the end of each term with written evaluations, and these will be discussed with the project staff. Some post testing will be employed to assess knowledge gain. The participants will also be surveyed approximately 12 months after completion.

Participants Response

The participants' reactions to the project were positive. In the survey, the participants rated both the project director and staff significantly above the norm for the program as a whole, and rated only one area significantly lower, that of job placement services which was not relevant at the time of the survey. The participants found the pace acceptable and one commented that the project "filled a gap" which could not be filled otherwise.

The expectations of this group appeared to be lower and more vague than some of the other projects. For several women, this project was a "career orientation." The lack of high expectations may reflect the need for direction which the project director has already identified in her students. On the other hand, it should be noted that lower expectations are more realistic; and it is refreshing to find participants that do not demand that NSF guarantee them a job before they enter the project.

Evaluation and Recommendation

It is very difficult at this early stage to make substantive recommendations. It is not at all clear what the outcomes of this project will be either on the participants or the institution. However, the project appeared to be well designed, both from the proposal as well as from preliminary project information. The project director succeeded in reaching the target population, and the participants' needs appear to have been met.

The participants outcomes may depend upon the ability of the project to help the participants clarify their goals such that they can and do fulfill their potential, and the project director might want to include more orientation activities aimed at addressing these goal clarification needs.

THE CITY COLLEGE, THE CITY UNIVERSITY OF NEW YORK

New York City, New York

Project Directors:	Dr. Deanna Chitayat, Center for Advanced Study in Education Dr. George Ross, Chair, Department of Computer Sciences
Project Name:	Enhancing the Potential for Women in Science
Emphasis:	Retrain women with Science B.S. to systems analyst
Duration:	Two semesters, full-time

Proposed Project

Enhancing the Potential for Women in Science is a joint effort of the Center for Advanced Study in Education of the Graduate School, The City University of New York, and the Computer Science Department of City College, The City University of New York. The goal of the project was to retrain women with science backgrounds to enter the job market as Systems Analysts (advanced computer programmers) in an area related to their field.

The project was to begin with an introductory conference to inform women of the project and interest them in retraining in the field of systems analysis. This conference was to serve as a mechanism for both recruitment and orientation. Forty-five participants were to be selected on the basis of a requisite B.S. in the sciences, a project-developed aptitude test in computer sciences, and a personal interview to ascertain potential in computer applications area.

The technical component of the project was to be a two semester sequence of course work and research, broken by a summer recess. The courses were to be developed specifically for the participants. The core courses for all participants were to include: data structures, computer compiling and systems programming, and computation in science. In addition, each participant was to take a two semester science applications laboratory which would be a supervised computer research project in the participant's field of previous training. The supervisors of the research were to be faculty members in the participant's discipline. The course work was to be complemented by weekly industrial seminars, given by invited industrial speakers to provide role models and maximize participant exposure to the spectrum of computer applications in industry.

The nontechnical component was designed as a three hour workshop each week for both semesters, with the following proposed agenda: self awareness (motivation advance and positive self image, alleviation of role conflict) and placement counseling and assistance for either a job or for graduate school.

The project was designed to be full-time, with 12 hours a week of course work, plus homework and project related activities. The instruction would be conducted at the CUNY Graduate Center, where all necessary computing facilities would be provided.

Rationale, Assumptions, and Expected Outcomes

The rationale for this project was the under-utilization of women in the sciences and the growing demand, both nationally and locally, for computer specialists. Its assumptions were:

- A two semester project in systems analysis will provide the participants with skills in systems analysis which will update and enhance their previous scientific training, thus facilitating their reentry into job or graduate school.

- The potential of the participants will be improved if the course work is combined with a counseling component which will attempt to deal with the factors identified as inhibitors of career achievement motivation, and a career information-job placement program.

The expected participant outcomes are:

- New awareness of their competency to succeed in a male-dominated profession.
- Better position to succeed in either a job or graduate school, due to research experience and training in systems analysis.
- More personal contacts, and job search skills which will facilitate job placement.

The expected institutional outcomes are:

- A cooperative venture between a department that is primarily male and science oriented and a department which provides support services for women; and the development of a model which could facilitate the reentry of women into the sciences.
- An assessment of the utility of this model as a component of the curriculum of the School of Engineering.

Implemented Project

The recruiting and publicity component consisted of, publicity through the mass media, an alumni mailing, and publicity in alumni newsletters. The introductory conference was held as planned with an attendance of 290 women, 225 of whom subsequently submitted an application for the EPWIS program. Most effective of the publicity measures were ads in the New York Daily News and New York Times (20 percent), Alumni mailings (32 percent), and word-of-mouth (17 percent).

The participant selection proceeded as planned, with the computer science aptitude test administered to 129 applicants.*

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*No personal interviews were deemed necessary.

The project selected 48 participants, the majority from the New York area. 42 percent had Master's Degrees; 75 percent were employed during project participation.

The project curriculum was implemented as planned, with the women taking the technical core, beginning their research projects under faculty supervision, and attending the counseling workshops. The majority of the course work was scheduled in the evenings, but the homework required extensive use of the computers. Thus, the project was very demanding. Nevertheless, the highly motivated participants worked hard, and their progress was judged by their instructors to be superior to that of a class of City College undergraduates. No standardized tests were administered to measure the performance of the participants; project staff judgement was relied upon.

The counseling/job skills component proceeded as planned including group counseling to increase personal awareness and workshops with industry representatives. The industry representative meetings went better than had been anticipated; although the women had not finished the project, many were subsequently offered jobs by the industrial representatives. Since the project staff felt that most women would receive better job offers and have a higher potential for advancement as a result of completion of the project, they decided to select industry representatives more carefully.

This project had a fairly high attrition rate, both because of withdrawals for the normal reasons, and the job-related ones described above. In order to continue to operate at capacity, the project directors decided to introduce a special summer session for a new group of participants which would cover the same material as the spring session. The two groups would be merged in the fall. The summer session was successful in recruiting applicants, and the two groups were successfully joined in the fall. The summer session received much less counseling due to time constraints. It is expected that the between group differences could be analyzed to help assess some results of the counseling program.

Project Staff Organization and Management

The project co-directors, Drs. Deanna Chitayat, and George Ross, appear a good team. Dr. Chitayat handles the nontechnical components, while Dr. Ross administers the technical and academic components. The core course teaching is performed by members of the computer science department, with Dr. Ross supervising the research projects. Dr. Chitayat, in addition to organizing the counseling workshops, served as a liason between the participants and the teaching staff, articulating the women's fears and concerns, and, met with the teaching staff frequently in the first weeks to orient them to the needs and concerns of the reentry women.

Participant Responses

The participant responses were highly critical. In every aspect, the CUNY particpants rated this project below the norm for the program. The participants complained of disorganization, insufficient facilities, extremely difficult course work and a demanding pace. Several survey respondents complained that the problems of single working people were not emphasized--that the program emphasized mothers too much. Others complained that the schedule was to difficult for working people, and several women commented that too much time was spent on consciousness raising.

On the other hand, expectations in this group were high. Most respondents expected, as the outcome, a job. One even commented that she would not pay tuition because there was no guarantee of a job. Throughout the survey, we have discovered that, high expectations and a demanding curricula correlated with a higher complaint level for the project. Nevertheless, this low level of survey respondents' satisfaction should not be ignored. The project directors may have "oversold" the program to the participants, creating the higher expectations, and did not adequately counsel the potential participants regarding the time commitments necessary.

Evaluation and Recommendations

On the whole, the project appeared well designed, with research conducted on local as well as national job prospects. The possibilities for favorable participant outcomes appear high. The retained participants seemed enthusiastic; several inquired about being assigned summer research projects or homework. As an experiment, it could potentially provide much useful data.

The implementation seems to have been a little rough. The participant response suggested that while the joint project director approach had benefits, they were not realized initially due to coordination problems.

The possibilities for institutionalization appear good. The college, as a gesture of support for the proposal, lowered its overhead rate, making the institutional contribution equal to approximately 9 percent of the amount requested in the proposal. Letters of insitutional support were also included in the proposal.

Both co-project directors are committed to the project intent. Dr. Ross is especially interested in increasing the participation of women in the Department of Computer Sciences, and Dr. Chitayat has for several years engaged in research of and program development for reentry women. Thus, the team of a technical and nontechnical co-project director appears to be an effective one. The directors have worked extremely hard to make the project a success.

Participant attrition is one area that could improve. When the participants who left to take jobs are added to the dropouts, the attrition rate is high. Therefore, participants (especially those new to computer work) should be adequately informed of the time commitment a computer program often entails--including time at the terminal. In addition, the project directors might consider a better mechanism for participant feedback, so that they can more quickly recognize trouble spots.

One way to better address the problems of working women might be to have the program be a full 12 month one instead of a nine month, summer vacation program. This would enable the project to lower its pace without jeopardizing content.

CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

Los Angeles, California

Project Director: Professor Bonita Campbell, School of Engineering and Computer Science

Emphasis: Retrain to engineering

Duration: 12 months

Proposed Project

The Career Facilitation Project at the California State University at Northridge is a one-year project comprised of study and internship to retrain women with a bachelor's degree in mathematics, physics, chemistry, computer science, or engineering to enter engineering graduate school or the job market as engineers.

The 35 women selected were to design the project by participating in a one month orientation and review session, including diagnostic testing, self-paced review modules. individual counseling, and role model presentations. The participants were to meet for six hours a day, five days a week.

During the first month, the participants were to be placed in internships, which will provide a full-time paid job for a month. Counseling was to be provided to assist students in the adjustment to the employment environment. For the following nine months, except for the month of January, the participants were to attend classes in the morning and work at their internships for four hours in the afternoon. They were to receive instruction in material sciences, dynamics, electronics, fluid mechanics, and engineering economics in modular short courses throughout the year. Throughout the month of June, an independent project in the women's engineering emphasis was to be completed.

The project was to include extensive counseling. During the first month two days per week were to be reserved for the counseling activities as the project staff anticipates the transition to prove problematic for some participants. During the next month, one morning every other week was to be used for individual or group counseling. Finally, during the last month one half day a week was to be used in counseling and placement activities, including interviewing techniques and resume and/or graduate school application preparation. Assisting in the development and evaluation of the project will be an advisory council of the Dean of the School of Engineering at Northridge State, and representatives from local industry and engineering societies.

Rationale, Assumptions and Expected Outcomes

This project assumes that in a 12-month period, women with a science background, through intensive review, will acquire the knowledge equivalent to a Bachelor's in engineering, and be fully prepared to enter a Master's program in engineering if they so desire. It is to be coupled with an internship to provide the women with practical application of their training, a source of income, and an opportunity to find out firsthand if they would like a career in engineering.

The expected outcomes for particpants:

- appropriate placement (graduate school or employment)
- increased knowledge of engineering and awareness of the opportunities and career options in the field of engineering

- increased capabilities in job search skills and development of professional contacts

- increased self-confidence, positive self-image, and resolution of important role conflicts in order to facilitate the commitment to a career in engineering

The expected outcomes for the staff are:

- increased knowledge of the special problems of the returning women students

- increased ability to design and implement programs to meet the needs of the reentry women

The expected outcomes for the institution are:

- The development of a model for other similar projects in the sciences

- increased sensitivity to the problems of women in engineering and reentry women

- increased cooperation from and coordination with industry.

Implemented Project

Publicity activities were very effective and the program received 67 applications. Selection of applicants was based on prior academic work, motivation, dedication to pursuing full-time employment and degree of goal clarification. Some candidates were interviewed, but not all, in order to provide a measure of the utility of the interviewing process. The project accepted 41 women, 34 of these started the project. Approximately six months later, eight women had withdrawn. Of the withdrawals, half were placed in professional science positions in industry.

A special short course in FORTRAN was added to the July review schedule to aid the participants in course work and internships. The instruction pace has proved difficult and the instructors have decided not to present the material originally scheduled for June (individual studies) to allow more time for the spring semester course work. The modular schedule was also changed to teach two courses at once, half as intensively as originally planned, to allow more time for participants to digest the material. Self-paced instruction proved "disastrous" according to the project director, and was abandoned. It may be that the first month was not an appropriate time to begin self-paced instruction, with so many other demands on the participants' time during this month.

The project director reported some difficulty in getting the participants to use the counseling resources available to them, because the participants insisted on bringing all problems to the project director and ignored group counseling sessions. This was a common problem across projects.

The internship placement process took more time and proved more problematic than was expected, due to some companies not honoring their commitment to provide internships.

Project Staff, Organization and Management

The proposed project management is very detailed. Responsibilities are well delegated by the project director and principal investigator, Professor Bonita C. Campbell. Professor Campbell, a reentry woman herself with a background in both engineering and business administration, is very enthusiastic about the project and is highly committed to both the purpose and the quality of the project.

The evaluation plan for the project is comprehensive. The plan includes: faculty evaluation of students and vice versa, employer evaluations of students, the use of a multiple regression model to evaluate the utility of the selection process, a multiple attribute utility assessment model to evaluate counseling, and student evaluation of support services.

Evaluation and Recommendations

This project appears well designed, with a sound experimental base, and is creative and ambitious. The internal evaluation should provide some extremely useful information and analysis. The prospects for the development of a sound model project are good. Especially attractive is the financial support this project provides for its participants while they undertake the learning experience.

The project is intense; it is not clear exactly when the women would sleep or do homework, especially if they have some competing interests at home. However, if the participants are as motivated in this project as in others, they may be able to handle its intensity although at the time of the DRI survey, the participants were clearly showing strain.

The reports from the project director regarding the implemented program showed that many changes were made in the ability to effectively identify and respond to problems. These changes probably give rise to the feelings of disorganization among the participants. Perhaps the participants were not adequately warned that this was an experimental project.

It is to early to adequately assess the outcomes of this project, but prospects for the participants look good. The project director reports that the faculty attitude in the school was not particularly supportive at the commencement of the program, but as the project has progressed there has been a marked increase in interest, assistance and participation.

Particpant Responses

The participants who responded to our survey ranked most of the components average in comparison with the other projects in the program, with the curriculum organization ranked less than average. The components from the respondents showed strain, caused by the difficult schedule set for the participants. For many women, the pace was very hard when compounded with family responsibilities. Finances were a problem for some; loans that the project director tried to help arrange came late, and the paid internships took longer than anticipated to arrange. The above problems were compounded by some organization problems and a less than homogeneous group.

On the positive side, for many participants, the combination of curriculum/internship is "terrific," and all appreciated the internship opportunity. Several of the program dropouts commented that they withdrew because they took full-time jobs acquired as a result of interviewing for their internship. One such respondent commented that she "discovered I was employable after all."

STATE UNIVERSITY OF NEW YORK AT STONY BROOK

Stony Brook, New York

Project Directors:	Drs. Patrick J. Herley and Franklin F.Y. Wang Department of Materials Science
Project Name:	Women in Science and Engineering
Emphasis:	Retain and Update to Materials Science and Engineering
Duration:	One semester Study and Summer Work (8 week remedial option)

Proposed Project

The Women in Science and Engineering project at the State University of New York, Stony Brook, was intended as a project to retain women with Bachelor's Degrees in Engineering, Physics, Chemistry, Biology, and Health Sciences to enter the job market or graduate school in material science engineering.

Twenty participants were to be recruited through the use of local newspapers, radio, local organizations (libraries, women's groups), personal contacts with industrial firms, and through various academic institutions. Selection was to be based on candidates background and academic needs.

The process of selection was to include a personal interview with the project director and the Industrial Advisory Committee. The Industrial Advisory Committee is to be composed of members of selected Long Island Industry that have had previous experience in advising the Materials Science Department. During the personal interview, members of the Industrial Advisory Committee and the project staff will evaluate the candidates background and academic needs. Selected candidates will develop, in consultation with the interviewing team, an individual plan of study for the project.

The core course work will begin with an 8 week optional individual review, designed by the student in consultation with the advisor, to assist the student in filing gaps missed or forgotton in their undergraduate basic sciences curricula.

The project was to consist of individual tutorials on the basics of material science. Readings and lab work were to be assigned individually, with a close monitoring by the project staff. The student's progress was to be evaluated with written examinations, and further individual work recommended where needed. In addition, an intense three month session of formal course work was to be required. The course work was to consist of lecture and laboratory six days a week and will cover the basic materials science courses.

After the three month intensive study period, the participants were to spend the summer gaining practical experience, either in an individual internship or research laboratory project at the University. The student will prepare a final report as her last assignment for the project.

Rationale, Assumptions, and Expected Outcomes

National demand for materials science graduates is projected to remain high, as materials science graduates traditionally number only a small percent of the engineering graduates. The discipline of materials science draws heavily from the disciplines of chemistry, mathematics, and physics; it therefore, represents an ideal area for the retraining of un- or under-employed women.

The project's emphasis is on personalized instruction and close industrial liaisons. The project directors emphasize faculty monitoring and support of each individual participant in order that she may gain the confidence needed in both herself and her future. The close industrial liaison should facilitate entry into the job market.

The expected outcomes include the following:

- Participants will become confident, capable, employable graduates whose academic weaknesses have been strengthened.
- The participants will also have the option of entrance to graduate school in materials science engineering,
- Through the industrial liaison, the participants should become aware of the job opportunities in the field of materials science.
- The faculty's awareness of the difficulties in programing for and teaching this type of student should be enhances.

Implemented Project

Twenty-two participants were selected from 35 applicants. Applicant recruitment proceeded as designed but more slowly, thus the project got off to a later start than planned. The Industrial Advisory Board was selected, consisting of two members from Long Island Industry, the project directors, an engineering college advisory, and a member of the Career Development Office.

Because of the delay in recruiting and selecting applicants, the instruction did not begin until March 1978. The time until May was spent in individualized tutorials, centered around the text. The participants met with one of the directors once a week to assess their progress.

Special lectures and laboratory sessions began in May for three hours a week. In June, the practicum component began, with a choice of outside internship or a research assistant internship. In the fall semester, the participants will have an opportunity to take courses from the regular Stony Brook offerings, most as normally admitted graduate students in the Master's Program.

Participant Responses

The participants who responded to the DRI Survey did not rate this project highly in all categories except job placement services, where it was slightly above average. The comments of our respondents are consistent with this evaluation; most were negative.

The participants did not find the tutorials to be of much value. One commented, "I could have read the book without the program." The respondents felt that the program was poorly organized, had no defined plan of study, and they felt a real lack of guidance.

On the positive side, almost all participants were very pleased with the practicum component. Both the ones who worked outside the University as well as those who worked with the professors on research, commented on the excellent opportunity the experience proved to be.

Evaluation/Recommendations

Both of the professors appear to be highly committed to the project. At this writing, it is not clear what the prospects for institutionalization are.

The major participant outcome appears to be entrance into graduate school. Eight of those who will proceed into the Master's

Program have been selected to receive special scholarships designated by the institution as grants to WISE participants, which will enable the student to complete a Master's Degree tuition-free and receive a cash stipend of $100 to help defray the costs of books and materials. The awarding of specific grants to the WISE students does indicate substantial commitment to this project.

The internships have apparently been an overwhelming success. However, it is clear from the participant responses that the project could use substantial improvement in the area of curricula. The actual hours spent in course work do not appear to be many, and the value of them appears to be limited. It is not clear that the program actually retrains the women or introduces them to the subject. Perhaps the directors may want to spend more time in planning specific course work if this project is continued.

CHATAM COLLEGE

Pittsburgh, Pennsylvania

Project Director:	Dr. Diane K. Wakefield Department of Chemistry
Project Name:	Women in Science
Emphasis:	Update and retrain to Industrial Chemistry; management emphasis
Duration:	12 months

Proposed Project

The Women in Science project at Chatam College is an update project with an emphasis on industrial chemistry. The project was to be conducted for a 12-month period and was to include review, course work, laboratory, an industrial seminar, internships, and a management training option. The project was to begin with a two-week career planning workshop held several months before the initial course work, open to all interested women with science degrees. The purpose of the workshop was to be recruitment and project introduction. The workshop was to explore career options and the problems women encounter when returning to professional life.

Twenty participants were to be selected on the basis of an application and a personal interview with the selection committee. The selection committee was to be chaired by the former director of Chatam College's reentry program. Selection criteria were to include, past history of achievement, realistic possibility of applicant completing the project, and level of motivation.

The course work was to begin in January with two one-month introductory courses in Computer Science and technical writing.

February through May was to consist of one-month short courses to review chemistry, and industrial chemistry, and a laboratory review course. The industrial chemistry course was planned as a seminar, taught by visiting lecturers from local industry, In addition, the women are expected to undertake a systematic study of current instrumentation in order to prepare themselves to attend the annual Pittsburgh Conference on Applied Chemistry.

During the summer, the women were to take elective courses. They may take an additional computer course, undertake a laboratory research project, or take special project courses offered in management and industrial economics. A two-month industrial internship may also be taken during this time.

The final months of the project, September through December, will continue to be elective programs. Internships and/or research projects will continue or begin, new management objectives will be offered and a field-based chemistry seminar will be offered. All participants will take a mini-course in placement and job hunting. Throughout the project, counseling is to be available.

Rationale, Assumptions, and Expected Outcomes

Women are underrepresented in the chemistry profession, and national projections show good prospects for future employment in chemistry. Pittsburgh hosts a number of large chemical and chemistry related industry.

The objective of the Chatam project is to update knowledge and skills to enable women with degrees in science to enter or reenter careers in laboratory or management-based activities. The management and industrial economics program is specifically designed to prepare the participants to assume management responsibilities, thus reducing the tendency of women to stagnate in technical positions.

The expected outcomes are:

- Participants will become competent and confident in their ability to handle laboratory work or management in the chemical industry. Through the counseling activities, the participants will be able to handle conflicts which may arise between family and job responsibilities.
- The participants will have a successful placement.
- The institution will use this project as a model for similar programs as part of the institution's continuing commitment to adult women's education. The increased cooperation between the college and local industry should result in increased effectiveness of the college in the fields of management and chemistry.

Implemented Project

Forty-one women applied, 30 women were invited to participate, and 23 accepted. After the first term, two participants dropped out; one to take a job in instrument sales, one to relocated with here family.

The proposed career workshop was modified from one-week to two-days. The workshop attracted 65 participants and was well received. The workshop featured panel discussions regarding the problems and opportunities for careers in science for women.

An industrial advisory committee was formed, and the curriculum was reviewed. On the recommendation of the advisory committee, a short course on Industrial Health and Safety was added.

The technical component proceeded mostly as proposed. Almost all the participants elected to take the management courses, and many chose to take additional computer work.

The participants were each assigned an advisor and were asked to keep a journal of their experiences and reactions to the project submitted regularly to their advisor. The journals were discussed (anonymously) by the staff in an attempt to better serve the student's needs. The journals enabled the advisors to serve as liaisons to the project staff as well as more effectively advise students.

Project Staff, Management, and Organization

The project appeared to have a very competent and concerned staff. Chatam College is a small women's college in Pittsburgh which has had a reentry program for women for five years. The chair of the placement committee, Ms. Betsy Suatoni, has had much experience with the development of programs for the mature woman, as have many staff members.

The project was well organized, with the responsibilities for various components allocated. Nonetheless, a lot of responsibility falls on the project director. Dr. Wakefield has proved equal to the task, and her personal efforts have contributed much to its success.

The project hired as consultants a team of outside evaluators to conduct the formative and summary evaluation. The evaluators are using such tools as pre-post questionnaires, participant meetings, staff interviews, outside feedback, and internship evaluations. The evaluators, in cooperation with the career-job counselors, are using a videotaped job interview simulation to evaluate the participants' readiness to enter the professional world.

Evaluation and Recommendation

This project has a high probability for successful outcome due to two factors. (1) the setting and staff and (2) the concept. Chatam College has had a long-standing commitment to the education of women, and recently the education of women of all ages. The college has had five years of experience in meeting the needs of reentry women through their Gateway program. Both the faculty and the support staff, therefore, brought valuable experience to this project. The college has also had a long liaison with the Pittsburgh industrial community.

Much of the success of the project can be attributed to the dedication of the project director. This is common in these projects; most project directors worked very hard to keep their projects together.

The design of the project is original. The underlying philosophy is that the participants need the tools to deal with the professional world, as well as the knowledge. The management option and the emphasis on industrial and field-based chemistry should provide this. Both explicitly and implicitly, the project appears to meet and address many of the constraints women face in entering and reentering nontraditional careers.

MOUNT HOLYOKE COLLEGE

South Hadley, Massachusetts

Project Director: Dr. Edwin S. Weaver
Department of Chemistry

Project Name: Women in Science Summer Program

Emphasis: Laboratory Update in Chemistry

Duration: Two Weeks

Proposed Project

The Women in Science Summer project at Mount Holyoke College was designed to be a two-week intensive lecture and laboratory in the use of modern chemical instrumentation. The project proposed to emphasize short term, intensive laboratory experience, complemented by placement and counseling services.

During the month of August, Mount Holyoke offered two two-week sessions designed for 20 participants each. The sessions were to have classroom lectures in the morning, with four to five hour laboratory in the afternoon.

The first week of the project was to cover a review of the basic instruments of modern chemistry. During the second week, the women were to have the option of choosing other instrumental methods to study, or pursuing a mini-project using one of the methods studied in the first week.

During the evenings, counseling and placement activities were to be scheduled, and during the second week, employer representatives were to outline areas where employment opportunities exist.

Forty participants were to be selected, 20 for each session. Selection was to be based on the requisite Bachelor's Degree in Chemistry, the strength of the undergraduate record, and the promise for future achievement.

Rationale, Assumptions, and Expected Outcomes

The project assumes that women can and will review the theoretical material of chemistry at home. However, laboratory experience is difficult to acquire, and development of instrumentation has occurred rapidly in the past decade. Therefore, the most pressing area where instruction is needed for the unemployed chemist is in the laboratory. The assumption of this project is that the participants can, in intensive sessions, develop confidence in the laboratory which will enable them to enter the chemistry job market.

The expected outcomes are:

- The participants will return to active scientific life.
- The institution will acquire further experience in working with mature and reentry women.
- The project will be a pilot for other programs for reentry women.

Implemented Project

Publicity and recruitment activities were successful. The project received 45 applications and had 40 participants. The lectures and laboratories proceeded as planned. No grades or tests were given, but the director was pleased with the progress of the students.

Most of the students returned to activities already in progress before undertaking the project, either their current job or schooling.

Project Staff, Organization, and Management

The main instructor for the project was its director, Professor Weaver, assisted by Mount Holyoke lab assistants. The nontechnical component was designed and presented by the Career Services Office at Mount Holyoke.

Participant Responses

The participant responses to the DRI Survey were very positive. In every area except job placement services, the project was ranked well above average for the program as a whole. The project director and staff were given exceptionally high rankings by the respondents. One woman commented, "I feel unequivocally enriched by my participation in the NSF Women Science Program," another commented that the project gave here the confidence to apply for her present job. Many respondents commented on the benefits of living and studying with 20 other women for two weeks (the women lived in Mount Holyoke dorms for the two weeks).

Most respondents' expectations of this project were low: to get back into chemistry, to learn modern instruments. This is a very different expectation from participants of other projects who wanted to begin a new career. In sum, this project appeals to a different population than other projects, and the project appears to meet the needs of this group, the design appears to be warranted.

ALCORN STATE UNIVERSITY

Lorman, Mississippi

Project Director: Dr. Ruth M. Brady
Department of Physics and Chemistry

Emphasis: Update chemistry, biology, physics; partially targeted for women science teachers

Duration: Summer

Proposed Project The Career Facilitation project at Alcorn State University was designed as a summer project of lecture and laboratory work, to update and upgrade the background of the participants, stressing exposure to modern theory and instrumentation. It was designed to facilitate reentry into graduate school or the job market.

The proposed project was an interdisciplinary course in biology, chemistry, and physics; the specific subject matter of the course was to be designed in response to the needs of the participants. After the needs of the participants have been assessed, the proposed curricula would be submitted for comments and evaluation to a selected group of high school teachers, science employees, and local industry.

The project was to be a six week session, held eight hours a day, throughout the summer. Participants were to be encouraged to use the University's center for counseling and placement for advise regarding appropriate training and job prospects.

Twenty participants were to be selected from among women in three categories: Science teachers in local high schools, Women underemployed in scientific positions, and Unemployed women with B.S. degrees.

Evaluation and Recommendations

This project is innovative and not consistent with other projects in that is was short and includes no theoretical review. The project appeared well researched. The concept is based on a survey of former majors in the Chemistry Department, to determine the schedule and month this type of training would be most useful.

This project is noticably lacking in a strong counseling component. Personal counseling is very informal; no active motivational-type counseling is planned. There are no plans to address explicitly many of the types of conflicts research has shown to occur frequently in reentry women. We are not sure of the impact of this lack of non-technical component. It may be that this project serves the needs of a different population than the more conventional projects, and this population does not require such services as personal counseling.

The project will be continued, irrespective of NSF funding, as the President of the college agreed to use discretionary funds to support the project. This commitment proved unnecessary since the General Electric Foundation has provided funds for continuation.

Rationale, Assumptions, and Expected Outcomes

Alcorn State University, located in rural mississippi, is the oldest land grant college for blacks in the U.S. Within a 200 mile radius of Alcorn there are several major science-related industries as well as medical, and clinical laboratories which employ many chemists.

The State of Mississippi has recently ordered all secondary school teachers to upgrade their level of certification to an M.S. or M.S. Ed. degree level. Many women science teachers may need to return to school to upgrade their education, since they may have entered their science education positions with a weak background in science, majoring in physical education or home economics. The project, therefore, was particularly targeted to the upgrading of the scientific knowledge of the teachers in the Alcorn area in order to improve the quality of high school science education and facilitate the upgrading of the women science teachers' credentials.

The expected outcomes from this program are:

- Participants will gain a review of modern principles, and instruments in order to compete more effectively for higher-level positions in science or entrance to graduate school.
- The institution can use this project as a pilot for a summer training program.

The participants' progress was to be measured by pre-post evaluation using standardized tests, and performance in class, lab, and on assignments/tests.

Implemented Project

This project had very little lead time between the time of grant award and the beginning of class work. This was probably the major factor in determining participation numbers. The project was designed for 20 women. Fifteen women applied, 13 were accepted, 2 rejected for lack of adequate background, 3 acceptees did not matriculate, so that it was filled to one-half capacity. Several prospective participants identified a lack of adequate notice of the program as the factor preventing their participation. Of the participants, only one experienced a change in her job status as a result of the program.

Project Staff, Organization, and Management

The project was directed by Dr. Ruth Brady, Professor of Chemistry and Chair of the Department, assisted by members of the staff of Alcorn in the teaching and developing of the courses. Dr. Brady has expressed a strong interest in improving the opportunities for women in the sciences.

Participant Responses

Only a total of three participants responded to the survey, and only one survey respondent made a comment about the program. This respondent commented that she felt the activities were "way beyond a practical setting." The Alcorn project was rated about average for the program as a whole by the survey respondents.

Evaluation and Recommendations

The outcomes of this project do not appear to be substantial. As noted above, most participants returned to their jobs held previous to the project. All indications are that the institution will not continue programs of this sort.

UNIVERSITY OF TEXAS AT ARLINGTON

Arlington, Texas

Project Director:	Professor Ann Benham Department of Chemistry
Project Name:	
Emphasis:	Update women in all disciplines of the physical and natural sciences; train in computer use and analytical instruments.
Duration:	1 semester + 1 summer

Proposed Project

The Career Facilitation Project at the University of Texas, Arlington campus, was designed as a multidisciplinary update project having an emphasis on learning to use the analytical techniques of the x-ray spectrometer, the electron microscope, and the fundamentals of computer programing.

Thirty-five participants were to be recruited through a variety of media announcements and advertisements, coordinated by the University's News Service. Participant selection was to be based on the requisite background and degree, and the results of an in-depth personal interview.

In the first phase, the spring semester, the participants were to take refresher seminars in their discipline. Special workshops in mathematics would also be held to help the participants overcome any "math anxiety," and to prepare the women for the computer course they would take in the summer. The seminars were to be followed by two short courses, in computer technology and programming, the other in the fundamentals of the electronics of scientific instrumentation with training in the use of various analytical instruments. The proposed project had no counseling component.

Rationale, Assumptions and Expected Outcomes

The University of Texas at Arlington is located between two large metropolitan areas, Dallas and Fort Worth. In both cities the employment potential for scientifically-trained women is good, according to local recruiters interviewed by the project directors.

The objectives of this project were to facilitate an increase in knowledge, self-confidence, and self-awareness. The project attempted to address many of the anxieties and skill deficits women bring to a technical career. The designed project provided for an update in their field, to enable them to compete successfully with current graduates, a math component to overcome math anxiety, and the computer science and electronics of instrumentation courses to help the women conquer their fears of the "instrument monster." The instrumentation area is especially targeted to teaching the women not only how to apply the instrument, but how it works and how to repair it. Thus the participants will acquire both confidence and independence in the laboratory. Expected outcomes are:

- Participants will have strengthened self-confidence and personal potential. The mastery of the technical material should overcome anxieties about success and feelings of inferiority and helplessness.
- The institution will gain experience in developing projects for this special group of women. The success of these participants should demonstrate to the faculty the potential of women to succeed in non-traditional fields.

Implemented Project

The recruitment and publicity efforts were very successful. One hundred seven application forms were returned from 160 inquiries. 72 were personally interviewed. Advertising was targeted to women scientists and mathematicians who were "eager to reenter the mainstream of professional work." Interviews for the purpose of assessing participants' needs and determining motivation and commitment were conducted by the project directors. (Initially there were two project directors, one dropped out.) 43 participants were chosen.

Participant attrition was high (40 percent). Out of the 43, two did not begin course work. 15 dropped out over the spring semester, 12 because of family obligations, one because she received a job offer, and the rest because of relocation of husband, for a total of 17 withdrawals.

The project director attributed many of the family-oriented withdrawals to frustration and anxiety with the math component of the project. The math course was self-paced, which the participants resisted. The instructors did not monitor the women as much as was needed, so that they were not sensitive to the difficulties the women were having with the instructional format. Many of the women had high math anxiety, which was not alleviated by self-pace instruction.

The course work proceeded much as proposed. Spring short seminars were held in the major areas (chemistry, physics, mathematics-computer science). The project director decided to apply for permission to grant graduate credit for the course (which they received), and the participants were enrolled as special graduate students. In several science disciplines, there were not enough participants to conduct a special class, so the students were enrolled in regular graduate courses. Tutors were arranged to provide assistance with the material.

One month into the course work it was decided to add a counselor to the staff. This was in response to both attrition and participant problems of adjustment, which the project staff could not handle. Workshops were also held in leadership training, assertiveness training, goal setting, and basic job hunting strategies. These workshops were not always well attended, due to both quality and scheduling problems.

A placement brochure, containing resumes of all the participants was printed and distributed to science recruiters as an aid to placement. The brochure was very well-produced, and should be an effective placement tool.

Project Staff, Management and Organization

The project director, Professor Ann Benham, has had experience working to develop the potential of women in science. A reentry woman to science herself, she has had personal experience with many of the problems women face when they have left the work force. Professor Benham had responsibility for recruitment, selection, and administration. The curriculum development in the various disciplines and the special courses was the responsibility of the staff members from each division participating. Placement will be handled by the University's Placement Service. No evaluation plan was contained in the proposal. Advanced graduate students in psychology were hired to assist with evaluation.

Evaluation and Recommendations

The implementation of the project is superior to its proposal. It is an innovative and ambitious project. Instead of addressing one discipline, the project serves as an umbrella for several areas, a sort of continuing education program for reentry women in the sciences. This umbrella approach was probably too ambitious for the first year, it might have been better to concentrate on three major areas and then expand to other disciplines. However, the umbrella approach is an efficient way to serve all science disciplines, and could provide a model for expansion of other projects.

The major weakness of this project is the lack of design in the nontechnical components. The participants and the staff needed much more preproject orientation and counseling. Through advance counseling, particpants should be able to assess the available support resources, and to anticipate the potential difficulties. All personnel, staff, and consultants, should be carefully screened in terms of perceived attractiveness by particpants, their ability to communicate with the women, serve as role models if possible, and their ability to respond to the needs of the reentry women--to be supportive, to look for problems, to find solutions. Finally, the project director should have a clear understanding with the participants regarding what is expected from them, including attendance in class, counseling workshops, and special seminars.

Professor Benham has shown great dedication and flexibility in working at this project. She has made great steps in learning to work effectively with the students, as have several of the project staff. Institutional outcomes here, even at midproject, appear to be substantial as several staff members were very impressed with the capabilities of the students.

In light of the project experiences, it may be advisable to begin with only math coursework (self-paced if that can be made to work), for all participants, on a part-time basis, with intensive counseling and orientation activities or a technical writing course to complement it. This period could also build a peer support network, which would then serve the particpants as they went on their separate ways.

A more formal advising system, so that participants learn to go to the professors for help and assistance might be helpful. Most reentry women will not at first go to the professors for help, as this project discovered. A regular academic advising system, with active participation by the professors could facilitate this interaction.

Participant Responses

Although the participants who responded to the DRI survey ranked the components of this project about average or slightly above average in comparison with other projects, the comments were mixed. Especially noted was the lack of provisons for working women. Apparently Professor Benham handled the hetrogeneity of participants extremely well, as not one respondent commented on this problem. The participants found the outside seminars helpful, and for several women the project provided a first opportunity for meeting "like-minded women." For another participant the project was a "good bridge," indicating that she perceived the project participant a necessary component in achieving her goals.

SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE

Edwardsville, Illinois

Project Director: Dr. Charlotte O. Lee

Project Name: Women in Science

Emphasis: Retrain women to fields of food chemistry and/or environmental chemistry

Duration: 9 months (one academic year)

Proposed Project

The Women in Science Career Facilitation Project at Southern Illinoi University was a nine-month project to retrain women with degrees in biology or chemistry to the field of industrial chemistry with a specialization in the areas of food chemistry and/or environmental sciences.

The project was designed for 24 participants in the southern Illinois-St. Louis metropolitan area. Participants qualified if they received a Bachelor's Degree during the requisite time period, and had an adequate background in analytic and organic chemistry. The project components were to include: chemistry courses, math courses, technical writing assistance, and counseling services.

The instruction was to span three quarters. The chemistry curricula was to include a review of basic concepts; two courses in environmental chemistry and two in food chemistry, and a research seminar and an individual research project. In addition, a three quarter math sequence for chemists, a computer programming course using fortran, and statistical methods course were planned. During the first quarter, a technical writing seminar to refresh and improve the women's writing skills was scheduled.

Personal counseling was scheduled for two hours per week, with half of the time devoted to individual counseling. Job and graduate school placement was also to be provided. Workshops would be held to improve participants' communication and interviewing skills, resume writing, and other skills helpful in facilitating entrance into the job market. All courses were to be developed especially for the participants.

Rationale, Assumptions and Estimated Outcomes

According to the proposal, national employment opportunities are estimated to increase in the next decade for women. Local employment in the Chicago and St. Louis areas also exist , although the proposal did not demonstrate that growth in the specific project areas would occur.

The expected outcomes were:

- Participants will become more aware of their capabilities, their potential for development, and their current skills. Their prospects for entry into science-related activities will be improved, as well as their confidence level.
- The project shou. l provde a data base for the institution from which to develop a general education course for women scientists who plan careers in science.

Implemented Project

Advertisements were placed in local and St. Louis metropolitan newspapers, brochures were developed and distributed, posters were placed in strategic locations, and public service radio announcements and radio talk shows were held to disseminate information about the project. Although 224 inquiries were made, only 25 women who submitted applications were qualified and as of October 15, 1977, the project had 16 participants, several inquiries were received from men, who responded to an ad for "mature chemists" in the ACS Journal. (The ad was worded in this manner because the journal forbids sex-specific advertising.)

Prior to the beginning of classroom instruction, a workshop for project faculty and staff was presented to sensitize the faculty to some of the needs and concerns of the mature student returning to the learning environment.

During the first week of the project a battery of standardized and diagnostic tests were administered as a basis for course development and evaluation of knowledge gain. The results of the tests showed that the participants were a very heterogenous group, especially in mathematics background as is common in these projects. The tests also confirmed a need for the planned technical writing seminar and its utility, later confirmed by the participants.

Several modifications were made on the basis of the results of the diagnostic tests. In the math class, many of the participants needed refreshing in algebra and computational skills. This resulted in a modification of the calculus material to be covered. The participants decided not to form two math sections, but rather to have the more advanced tutor the less skilled students. Alterations were also made in the syllabus for the chemistry review course to provide more extensive review in organic chemistry.

Overall, the project proceeded as originally designed. At the request of the participants, group counseling activities were increased and individual counseling activities decreased. Workshops in assertiveness training and a study skills/speed reading program were offered and field trips to local industry were held.

Several women in the project experienced anxiety about the academic environment which the project staff were unable to alleviate. This anxiety was evidenced by their consistent requests for audit status in courses, especially in the mathematics sequence. Some women also hesitated to attend field trips or begin preparation of resumes.

Participant Responses

All of the project comments were rated substantially below the average for the program, although on several components there was some disagreement among participants. In their comments, the survey respondents noted that the project was disorganized, and the staff did not function well as a unit. Some respondents found the counseling "condescending," although others wished that there had been more.

Apparently the job placement was less than effective, both because the jobs were scarce in the environmental area, and because in the words of one respondent, "Employers thought that we don't have enough experience to handle the job." The project director had perceived some discrimination against the women when she attempted to follow up on job placement activities.

The heterogeniety of participants was a real problem for this project, in the eyes of both the participants and the staff.

Project Staff, Organization and Management

The project director, Dr. Charlotte O. Lee, handled most administrative duties. The teaching duties were assigned to members of the faculty of SIUE. Dr. Lee is the Vice Chair of the Department of Chemistry.

The proposal included a formative evaluation plan for the assessment of the knowledge gain and participant outcomes. This plan was supplemented by the use of a stress test to assist in the development of the counseling components and in the evaluation.

Evaluation and Recommendations

It is clear from the technical reports submitted by the project director that the project staff learned much during the first year of this project. The staff demonstrated flexibility in responding to the participants needs and concerns. The project director conscientiously documented all of the problems encountered in implementation and the steps taken by the staff in responding to these problems. Consequently, from the point of view of an experimental project and learning experience, this was one of the most successful.

The project director may have underestimated the time and energy necessary for recruitment and publicity, a common situation in these projects.

The participants could possibly have used different kinds of counseling than were provided initially. Reentry women are typically highly motivated and have high anxiety levels, which often are expressed in "fear of failure/success" symptoms. In some projects, workshops given during orientation were able to combat these problems and improve self image before the results of diagnostic tests and assignments reinforced the participants fears. Peer group support is especially useful in these situations, the reason a workshop format may work better than individual counseling sessions.

While the proposal documented local employment and national trends, it did not satisfactorily document turnover and growth in the industries where the employment could be found. This kind of information is crucial for an adequate assessment of opportunities.

Finally, if the heterogeniety of the participants is indicative of the target population in this area, perhaps a more individualized approach would be useful.

Appendix D

EXAMPLES OF SCIENCE AND CONTINUING EDUCATION PROGRAMS FOR REENTRY WOMEN

Science Education

Retraining and updating. Very few science education projects for women with outdated skills were found. The following list includes some of the science education programs contact.

- Wellesley College previously offered a two-year program for women with a background in science. The program included a one-summer session covering the topics of math and chemistry. This session was used to determine if the women are qualified to begin a two-year part time program leading to a Master's degree. The program was funded through NSF until 1973.

- San Francisco State University Center for Advance Medical Technology has a newly funded project entitled "Retraining Medical Technologists for Career Reentry." The purpose of this program is to develop a retraining route for liscensed and/or certified medical technologists, usually possessing a baccalaureate degree, who have been out of the field for an extended period and are not current enough to obtain employment. The students are evaluated by an examination to determine if refresher courses are needed prior to the six-month on-campus training. Laboratory work on campus is directed at familiarizing students with new developments and the theoretical basis for new procedures. These labs will rely on audiovisual tutorial and slide/tape programs with an emphasis on self-paced learning. No financial support is offered to the students.

- The Cooperative Education "Women's Late Entry" program is in the planning stages at the Polytechnic Institute in New York. This program is designed for women with a Bachelor of Science degree in chemistry, physics, or mathematics. The purpose of the project will be to make careers available in engineering and science to women who are underemployed, unemployed, or who wish to change career directions. Prior to beginning the two and one-half year Master's level program, the women will be required to engage in a cooperative work period(s) and concurrently complete a self-pace, independent study remedial program (videotape presentations, tutorials, etc.).

- Many continuing education departments offer math anxiety/remedial math courses in their community. For example, the Continuing Education for Women Department of the University of Minnesota has been conducting math anxiety programs for approximately three years. Most of the 700 women who have participated were over 21. Schoolcraft College Women's Resource Center also offers courses aimed at decreasing women's anxiety with math with the hope of directing the participants toward science-related fields of study. Another school offering the math anxiety course is the Center for Continuing Education at the University of Michigan. Courses are offered to help women with math problems and prepare them for reentering an academic setting. Lenore Blum of Mills College is in the process of designing a program for reentry women that will focus on training math skills rather than only dealing with math anxiety.

- Xerox Corporation has a program to send employees (primarily female) back to school to obtain a Master's degree in computer science. About 40 women are currently at the University of California at Berkeley completing the program. The company pays tuition and living expenses for the student as well as a bonus to the department for each student.

Career change. A few programs specifically designed to help people change fields were located. The following list is all we found in the science and engineering fields:

- The Female Access to Careers in Engineering Technology (FACET) was originally sponsored by industry and is housed at Trident Technical College. The program provides the participants, both high school girls and mature women, with a summer pre-engineering program. The program is designed to upgrade math, science, and problem-solving skills. After completion the students have the option to enroll as students in the Engineering Technology curriculum which results in an Associate Degree. Counseling is available to the participants in the form of support groups and panel discussions. The topics generally covered are assertiveness and anxiety counseling. Approximately 100 women participate annually, most of whom are mature women. The attrition rate of these women is, however, very high due to personal "real life" problems. Although no formal placement service is available through FACET, the women have not experienced any problems finding jobs. Tuition and fees for courses are paid for by the project.

- The School of General Studies at Columbia University offers a program for both men and women who want to change their careers. This program prepares people for careers in medicine and related health sciences. All participants must be at least 21 years old and must have started college, but 70 percent have completed college degrees. Annually, enrollment starts at approximately 300 but only the strongly motivated students complete this program. The programs are individualized according to academics, time, and work schedules. Each student consults with a premedical advisor who recommends a course of study appropriate to the student's particular background and future plans. A one-year curriculum is planned with an average course load of 25-40 credits. Each credit costs $142.00 for which the student is responsible. Counseling is not a formal part of the program but students experiencing problems and needing counseling are referred to local experts. The students do maintain, however, very close relations with their premedical advisors. This advisor aids in medical school selections, reviewing grades, and securing letters of recommendation. The school does not guarantee a student will be admitted to medical school but a large percentage of students completing this program have been accepted

- The Foothills/D'Anza Community College district offers a science/technical training program for women over 25. The program, originally sponsored by Carnegie Corporation, is now supported by NASA. Women come into the program with a nonscience Bachelor's degree or some college work. During the program, they attend courses at the community college and have a paid internship at NASA-Ames that is half-time during the school year and full-time during the summer. The program leads to a certificate or an Associate Degree in science. Of the 100 women entering the program since 1975, almost all have been placed in jobs with salaries ranging from $16,000 to $18,000 a year.

Industrial Training Programs

About 50 companies who employ scientific and technical personnel were interviewed to determine what training they provided.

Most large employers offered three kinds of training programs. The first is on-the-job training. However, this training is usually "adjustment to the work place" involving knowledge of procedures, equipment, and expectations. It does not involve training in the scientific disciplines.

Many large employers also offer impressive continuing education programs. These programs are most often instituted when the employer judges that many of the employees need additional training in certain areas and then offers a group training session, conference, or seminar on the topic. Most of these seminars are not geared toward science, and most often include management, interpersonal, or accounting skills. Occasionally, a course on a scientific topic is offered, although most employers seem to feel that employees who are working in an area already possess current knowledge of new techniques and theories.

Finally many employers offer tuition refund programs, where the employee may enroll in courses during their off-hours at the expense of the company if the course is considered to assist the employee in professional development, and increases his/her value to the company.

Job Placement

We found no projects that specialized in placing scientists or engineers and very few that said they had placed any women scientists. The only one placing any number of women is described below.

- The Minority Women Employment Program was funded by the Department of Labor Employment and Training Administration as a demonstration project by the Office of Research and Development, and managed by the Recruitment and Training Program, with a subcontract to the University of Texas to undertake the research. It is showing dramatic results in placing unemployed and underemployed college-educated minority women in managerial, professional, and technical jobs. The project identifies well-qualified minority women, coaches them to produce favorable interview and test results, instructs them in resume preparation, and makes them available for job openings developed by the project. In addition, the project devotes at least as much effort to employer contact and job development as it does to applicant recruitment and assistance. More than 900 women have been placed thus far (at least 100 scientists and engineers.) About 65 percent of the placements have been in private industry; 10 percent in private, non-profit organizations; and 25 percent in the public sector. About half of the placements were unemployed at the time of their application to the program.

Job Information and Referrals

Many scientific organizations and women's caucuses have developed information networks in order to facilitate job placement for women. Some of these are rosters or directories that are useful in meeting affirmative action commitments as well as serving a useful resource for interested women. A partial list of informational resources follows:

- The Project on the Status and Education of Women has published a peper summarizing available rosters of women in professions. This is a synopsis of the Survey and Evaluation of Registries of Women in Professions (October 1973), and was updated March 1974 by the Federation of Organizations for Professional Women.

- The Spokane Community College in Washington offers women a direct connection to opportunities. The Women's Help Line is a convenient, complete source of information and referral for helping women help themselves. Women may call in and ask questions about local employment opportunities, job requirements, or education prerequisities. If no answer is available, women are referred to exisiting community agencies who can deal with their specific questions.

- The Women's Rights Information Center of Hackensack, New Jersey, is a nonprofit, comprehensive information and referral service similar to Spokane's. The goal of the Center is to make available to women the facts they need to make decision independently. Information is provided through education programs, fact sheets, telephone, or personal consultation.

- Another form of information is available to women in the form of clearinghouses. One such organization is The Professional Roster, which has been active since 1968. This is a clearinghouse for public and private business interests locally and within commuting distance of Princeton, New Jersey. The services provided include career and educational counseling; job talent bank; job listings; job placement; workshops and seminars; as well as a newsletter.

- Catalyst is a working woman's clearinghouse. This is a nonprofit organization concerned with developing and expanding career options for college educated women. Catalyst's National Network of Resource Centers makes available educational and career counseling, job referral and placement services to women at the more than 150 local resource centers of which it is comprised. Catalyst provides ongoing consultation to support these resource centers in their operations activities, and outreach. Catalyst also develops and distributes publications as well as providing services to help women recognize education and career options. One publication is specifically designed to inform and motivate women who have been away from school and are now returning to school in degree or nondegree programs (Catalyst 1975).

- The Center for Women's Opportunities, sponsored by the American Association of Community and Junior Colleges, is a clearinghouse of information for post-secondary vocational education opportunities for women. A newsletter is published which reports on new legislation affecting women, outlines the changing patterns of female enrollment in two-year colleges, and provides resource information. The organization has also attempted to provide technical services and liaison with public and private agencies and organizations.

- A national computerized registry of 1,000 women scientists has been developed in cooperation with the Association for Women in Science. The registry is designed to help women find employment in the fields of psychology, economics, mathematics, chemistry, medicine, engineering, and conservation. It is also used to locate qualified scientists to fill vacancies in advisory committees at educational institutions, government, business, and nonprofit organizations.

- The Regional Continuing Education for Women Program sponsored by the Office of Education, The Fund for Improvement in Postsecondary Education, is a Philadelphia network of college offices serving adult women. Formed by Temple University's Office of Continuing Education for Women, members also include coordinators at Bucks County Community College, Community College of Philadelphia, Delaware County Community College, and Montgomery County Community College. During its first two years, the institutions have informed numerous women of educational opportunities through widespread radio, newspaper, and television publicity about RCEWP programs and services. The project has produced a series "High-lighting Opportunities for Women" in cooperation with the Philadelphia public libraries; a number of programs featuring women in a variety of career fields; the publication of a "Guide to Higher Education Resources"; and a "Guide to Day Care Services and Early Education Programs." An important contribution has been 16 training seminars to sensitize professional staff and interested faculty at member institutions to the needs and concerns of adult students. The network has also embarked on research to assess the academic and service needs of adult women students at the college.

Internships

Several projects are designed to place women in internships, Examples of such programs follow.

- Project AHEAD, managed by the University of Kentucky, has been funded for the last two years by the Office of Education, Fund for the Improvement of Postsecondary Education. The women who hear about the program usually by word of mouth, are given some job counseling and then placed in a one-year internship in the type of job they are now considering irrespective of their previous area of study. The internships may be in either the public or private sector. Although one of the aims is to encourage women to continue their education many choose to remain permanently with their internship sponsor. Most of the women participating in the project have not completed a college degree, and few have science backgrounds. However, almost all of the women are mature, with the average age being about 35.

- Project Reentry, a program conducted by the Civic Center and Clearing House in Boston, is directed toward mature reentry women. This one-year program combines individual counseling with group meetings. The initial phase of the program allows women to examine career choices and the respective requirements. The second phase of the program places the women in an internship program. The internship is three days a week from approximately November through May. There is no money associated with the internship, but upon completion the women have the credentials required to actively look for the job of their choice.

Skills Acquisition and Academic Training

Scholarships for reentry.

Presently, over $11 billion is available to students through financial aid programs administered by federal and state governments, schools, foundations, corporations, local businesses, trade and professional associations, and civic organizations. These sources provide scholarships, grants, and loans. Many school and colleges also offer work-study programs which provide financial aid in the form of wages for college-based work.

Financial aid is usually limited to at least half-time students. Two-thirds of adults participating in education attend class for four or fewer hours a week—not enough to qualify for aid. A few of these scholarships, however, are geared toward the needs of older women, returning students, minority women, and those in professional and technical training programs (Project on the Status and Education of Women 1974). In fact, Ctalyst (1975) lists 13 scholarships especially for reentry women. Some of the available scholarships for the returning student include:

- Association for Women's Active Return to Education scholarships offer modest financial aid to full- or part-time students over age 25 who are returning to college after an absence. This scholarship is applicable only at selected colleges in California Arizona, and Texas.

- Career Advancement Scholarships are sponsored by the Business and Professional Women's Foundation. These scholarships are available to mature women returning to vocational, undergraduate, or graduate school after an interruption in their education

- Danforth Graduate Fellowships for Women offer financial assistance for women whose education has been interrupted for three or more consecutive years and who wish to pursue a Master's or doctorate in teaching or administration in secondary schools or colleges.

- George R. and Eliza Gardner Howard Foundation Fellowships are offered to individuals aged 30-40 who pursue studies in the fields of languages and literature, social sciences, history, philosophy, and fine, applied, or performing arts.

- Second Career Scholarships for Displaced Homemakers are available through the Business and Professional Women's Foundation. These scholarships provide funding for counseling to assess the displaced homemaker's needs and skills, and for job retraining.

- Sororia Alumnae Scholarships provide low-cost residence, grants, loans, and scholarships to women returning to school.

- The University of Wisconsin, Office of Fellowships, offers a returning student the E.B. Fred Fellowship. This is a one-semester award open to both men and women returning to complete or begin graduate studies. The candidate must be seeking a doctoral degree and must have had an interruption in his/her education for three years or more. The scholarship provides a stipend of approximately $2,500. There is no restriction as to the field of study once the fellowship is awarded. The original program was funded through the Carnegie Foundation and was specifically for women interested in returning to school.

- **The Bay Area Mathematics Network, currently sponsored by the Carnegie Foundation, is designed for educational professionals at all levels. Its purpose is to increase awareness of the consequences of avoiding mathematics, and to foster the development of innovative techniques to encourage students at all levèls, especially young women, to continue their education in mathematics.**

Independent Study and Alternative Education

Nontraditional education requires independent study and emphasizes off-campus learning. Instead of living on or near an institution of higher learning and attending classes regularly, the student may engage in some combination of the following.

Independent study. Independent study is perhaps the oldest and best know alternative method of learning (Elliason, 1978). Under the superivsion of a faculty member, the student receives lectures through the mail, does her own reading and writing assignment, and submits a paper or examination by which the teacher can assess her learning. There is a minimum of on-campus contact and, as can be expected, this form of study relies heavily on the discipline, initiative, and motivation of the student. It is particularly advantageous to a person who needs or prefers to work on her own at home. Independent study permits greater flexibility and tailoring of courses to the interest of the individual student and helps overcome geographic boundaries. A student in Kansas, for example, can enroll in a study program conducted from an institution in Vermont.

Originally reserved as "honor" courses, a certain number of independent study courses may be found in almost any institution. A growing number of degree programs, however, are almost exclusively independent in format. For example, the University Without Walls, formed by the Union of Experi menting Colleges and Universities, emphasizes independent study with no fixed lengths of time for completing degree requirements. Admissions policy and evaluation procedures are set by each participating college and university.

The "Open University" program has been adapted by several universities and institutions which offer one or more "Open University" courses. The teaching method includes correspondence study, courses on television, and personal contact with tutors and counselors by mail, telephone, or at learning centers (Catalyst, 1975).

Media learning. Media learning is a form of independent study which places the medium—television, radio, newspaper, or cassette--at the center of the learning process. Several programs around the country are taking advantage of the almost universal accesibility and conven ience of radio television, and newspapers. For example, courses offered at the State University of Nebraska use a grading system of satisfactory (S), unsatisfactory (U), or no credit (N) encompass multiple media programs, utilization of study kits, newspaper published discussions, and audio cassette and television programs.

- Television courses. Since Chicago's TV College began in 1965 over a public television station, WTTW, some 80 courses have been offered for credit and more than 400 students have received associate degrees for study entirely via television. Another example is Sunrise Semester, which appears at 6:30 every weekday morning over CBS-TV. Begun in 1957, it is produced in conjunction with New York University and has won four Emmy Awards. Many other colleges and universities are offering credit through public television courses. Some schools require that students attend weekly seminars on the series, while others merely ask for a midterm "contact" session and a final examination. Costs for the same courses provided on campus usually vary, particularly between public and private universities.

- Courses by newspapers. In the fall of 1973, lectures for "America and the Future of Man" were printed in 273 newspapers, large and small, across the country. Approximately 180 colleges and universities offered credit for course completion requiring attendance at a midterm seminar and the passing of a final examination. Another series, "In Search of the American Dream," was offered in 1974.

- Radio College. Radio College at Mercy College in Dobbs Ferry, New York, gives an English course for credit. In addition, Purdue University in Lafayette, Indiana, offers "Open University by Radio."

- Cassette Studies. The Center for Cassette Studies in North Hollywood distributes audio cassettes of "great teachers" to libraries throughout the country. Presently the University of California Extension at San Diego is preparing experimental national credit courses by cassette.

Credit by testing. Credit by testing is another educational avenue adaptable to the needs of mature women. Assessment techniques are being developed and amended to include the learning that takes place outside the classroom via correspondence course, independent study, employment, volunteer service, or life experiences.

Continuing Education for Women

In the past, full-time jobs available to reentry women have been primarily in the traditional female professions; since entry into higher-level jobs is usually dependent upon a college degree. Therefore, there is a need for more degree-oriented programs within "continuing education" for women. It has been estimated that there are more than 600 continuing education programs offered for adult women throughout the country. These programs which have served over 100,000 women (Katz and Knapp 1974) offer both noncredit activities and traditional for-credit courses, as well as counseling and group work in personal development or assistance in reentering the job market. A few of the more typical programs include the following:

- The Women's Center at the University of California at Berkeley has sponsored a variety of activities aimed at increasing access to science careers. Although these activities have been open to women of all ages, about half of those attending are typically women desiring to reenter the labor force. For example, the center sponsored a workshop on careers in engineering and computer science, and approximately 200 mature women from the community attended. The workshop was sponsored by donations from local businesses such as IBM and Bank of America. In addition, the Women's Center has sponsored workshops in the health sciences and statistics and has emphasized vocational flexibility given by a background in math/statistics disciplines.

- Indiana University has a Department of Continuing Education for Women. This department offers a reentry program which serves approximately 800 women annually. The goal of the program is to assist women of all ages in pursuing their intellectual interests. Women hear about this program through brochures, newspapers, and "word of mouth." The program offers a broad range of educational opportunities in the areas of women's studies, career preparation, self=identification, and marriage and the family. Credit and noncredit courses are offered in a variety of forms such as one- and two-day conferences workshops small seminars, and lectures. Semester long courses are also offered. Enrollment in classes is limited and fees vary according to the courses.

- Pennsylvania State University, through a Title I Grant for Higher Education, offers a program for reentry women. Workshops are held in the public library. The program objective is to increase female self-image, awareness, and assertiveness. Topics covered in the workshops include job hunting skills, job survival skills (women's rights, sex discrimination, etc.), and family engineering skills. This program is offered at no charge to all interested women. The aim initially was to attract 200 women to participate in the program, however, after only five months in existence, the total number of participating women was 300. Out of these 300 women, approximately 50 had a math, science, or computer science background. After completion of this program, approximately 25 percent of the women returned to school.

- The National Science Foundation is sponsoring a one-day conference at the University of California, Berkeley, to facilitate an information and resource exchange between underemployed women who have earned degrees in the life, physical, or social sciences, and professional women who have advanced their careers in these fields. Presently, there are three such projects. The other programs are located at the University of Dayton and the University of New Mexico. The NSF expects to support additional programs in 1979.

- Project Chance: Alternatives for Women at Brooklyn College, is a program which has been funded by the Department of Education, Fund for the Improvement of Postsecondary Education, and the New York Community Trust for the past three years. One distinctive aspect of Project Chance is its academic component. This is a 12-week, free, noncredit course which meets three hours a week. This is a reentry class and is offered both on campus and at various community sites. The course provides women the opportunity to: (1) increase their confidence in language and math skills, (2) consider career options, and (3) think through all the necessary steps involved in changing their lives. Project Chance also offers credit and noncredit college courses aimed at women who wish to continue their education.

- George Washington University College of General Studies, through the Continuing Education for Women Center, offers a basic counseling course, "Developing New Horizons for Women." Since 1964, more than 5,000 women, ranging in age from 18 to 78 and varying in education from not finishing high school to holding a doctorate, have completed the program. The courses are designed to help individuals assess themselves and their situations, focusing primarily on issues critical to life planning. In addition, some counseling groups help to analyze and communicate interpersonal skills.

- Barat College "converted" its predominantly residential college for 18-22 year olds into a postsecondary institution serving the needs of returning community women. With support from the U.S. Office of Education, Barat College accomplished this transformation so that now over 40 percent of its students are 25 years or older. Initially, returning community women were served,prior to and after enrollment, by a separate office combining counseling, service and advocacy functions. The office coordinated more convenient scheduling of classes, year-round course offerings, car pools, better child care, rearranged office hours, and changes in matters as mundane as mail boxes and vending machines. Barat College has now abolished the original office, folded its functions and personnel into existing offices, and has undertaken self-study and retraining to insure that the college continues to serve the needs of enrolled women of all ages.

- The Women's Educational and Industrial Union of Boston is a large nonprofit social service organization which offers career services. This program specializes in counseling and placement in business and the professions. Realistic counseling, occupational information, knowledge of specific job requirements, and available resources are provided to all applicants. The services offered include a placement service, career change exploration, individual counseling, group workshops, and resources and career information as well as speakers for meetings, conferences, etc.

- The Moore-Norman Vo-Tech School provides a Displaced Homemaker Program for women 35 years of age or older who, for several reasons, have become the primary wage earner in their household. This program offers a multipurpose center whose services include counseling, job placement training referral services, and a support system. The length of time needed to facilitate a displaced homemaker depends on the individual and no average length can be specified. A few of the programs offered are Electromechanics, Electronics, Dental Laboratory Work, Fashion Production Fashion Merchandising, Clerical, Medical Records, and Nursing.

Job Upgrading

A recent emphasis on the skills needed to advance in a profession is apparent in the number of new programs for already employed women. Few were found to be designed for women scientists. Some of the more typical ones include the following:

- The Minority Access to Research Careers program is sponsored by the National Institute of Health and the National Institute of General Sciences. The program is directed toward individuals employed full time at an institution which employs a significant number of minorities. This is a broad-based training program by which an individual may qualify for support in completing predoctoral, doctoral, or postdoctoral work. Initially the institute nominates an employee for the program, then the employee submits an application for participation. The participants are given a stipend consistent with their current employment salary and the participant must then take a leave of absence from employment. Approximately 100 people are participating in this program at any given time, all from various backgrounds. Of the participants, approximately 60 percent are women.

- Through the Affirmative Action program in the Food and Drug Administration, all men and women without opportunities for advancement are eligible for on-the-job training. Employees are allowed work release time for school in order to qualify as an inspector. The program enables advancement into a science-related career without salary penalty.

- The Higher Education Resource Services (HERS), Mid-Atlantic at the University of Pennsylvania is a placement service, concentrating exclusively on higher education administration.

- In 1973, at the American Council on Education, the Office of Women in Higher Education was established to promote women's advancement in academic administration. The purpose of this Council is to provide support to women who have the potential for assuming major roles in academic administration. With a three-year grant from the Carnegie Corporation, the Office is identifying women in key positions in as many as 40 states to serve as coordinators for programs that will reach out to institutions within those and neighboring states. With ACE's help, these women are organizing panels of high-level administrators who will meet to develop strategies to identify, refer, provide support services for, and increase the visibility of women administrators and position them for promotion.

- The National Women's Education Fund (NWEF), also sponsored by the Carnegie Corporation, was organized in 1972 to develop educational programs to help women overcome the obstacles they encounter in seeking leadership positions in public life. In 1975, a corporation grant underwrote an NWEF-sponsored workshop on political campaign strategies and techniques. In conjunction with the

Center for the American Woman and Politics (CAWP) at Rutgers University, a study of women's campaign experiences in state and national elections in 1976 was undertaken.

- The Barbara Holts Associates, Inc., recently began an intensive workshop series entitled "Career Advancement." This program enables participants to clearly determine career goals, explore the full range of job possibilities, and learn to articulate these skills. The workshops stress planning and conducting a successful job hunting campaign. Each series consists of four two-hour workshops.

- The Center for Advancement of Women in California offers a Women's Opportunity Convention. During this convention, more than 100 workshops, exhibits, and seminars are presented. The convention is directed toward women who want to enter or improve their position in the job market. The topics covered include how to be your own money manager, dressing for success, resume writing, goal setting, careers in sales, how to start your own business, investments, etc. This is a one-day workshop which has a minimal fee.

- The National Association of Bank Women originally started a program for women to aid in upgrading women's positions in banks and increasing the number of management positions. The program was funded by the Carnegie Foundation and conducted by Simmons College in Boston, but has now been incorporated as part of the Simmons College curriculum. Only women employed in banks are eligible participants in this program. The program leads to a three-year undergraduate degree (B.S. in management). There are core "institutes" for credit which meet twice a year for two weeks. Some credit hours (up to 24) may be given for prior learning experiences. Simmons College is one of four school now offering this program; the others include: Mundeline, Chicago, Illinois; Pittzer, Clairmont, California; and Louisiana State University, Louisiana.

Appendix E

BIBLIOGRAPHY OF RELEVANT SCIENCE AND CONTINUING EDUCATION PROGRAMS CONTACTED

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Appendix F

EMPLOYERS QUESTIONNAIRE

EMPLOYERS STUDY

Hello, I'm ____________________ from Associates for Research in Behavior, a research company in Philadelphia. We are doing a study among employers of scientists and would like to have your opinion.

1. Approximately how many scientists (that is, chemists, biologists, physicists, mathematicians, or computer scientists) are currently employed by your company?

   ____

2. When you are hiring scientists for your company, what attributes are you looking for, that is, how would you describe an ideal applicant for a position with your company as a scientist?____

   ____

   ____

3. Which of these attributes would you say your present scientists are especially likely to have?____

   ____

   ____

4. Which would you say they are less likely to have?____________________

   ____

   ____

5. Approximately how many scientists did you hire in the past year?__________

6. About what portion of the scientists you hired in the past year had:

Ph.D.'s	__________
Master's Degree	__________
Bachelor's Degree	__________
TOTAL:	100%

7. About what portion of the scientists you hired in the past year had no work experience as a scientist when you hired them--that is, you hired them directly out of college or their work experience had been in other areas?____________________

8a. Do you have formal on-the-job training programs for new employees?

1( ) Yes 2( ) No (PLEASE GO TO Q. 9)

8b. IF YES:
Please describe this/these programs.____________________________________

____

____

9. How strongly do you agree or disagree with each of the following statements; that is, do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree? Remember, all of these statements refer to scientists. READ LIST

	AGREE		Neither Agree nor	DISAGREE	
	Strongly	Somewhat	Disagree	Somewhat	Strongly
a. A desirable applicant for a position as a scientist has a Ph.D.	1( )	2( )	3( )	4( )	5( )
b. Men work out better as scientist employers than do women.	1( )	2( )	3( )	4( )	5( )
c. It is desirable for an applicant for a position as a scientist to have previous job experience as a scientist.	1( )	2( )	3( )	4( )	5( )
d. Women scientists are absent from work more frequently than men in comparable positions.	1( )	2( )	3( )	4( )	5( )
e. Applicants for scientist positions who come directly from college work out better than those college graduates who have not worked for 10 to 15 years.	1( )	2( )	3( )	4( )	5( )
f. Men scientists are more willing to spend extra time at work than are women scientists.	1( )	2( )	3( )	4( )	5( )
g. Applicants for scientist positions who come directly from college work out better than those with previous job experience.	1( )	2( )	3( )	4( )	5( )
h. Male applicants for positions as scientists would fit in better than would female applicants.	1( )	2( )	3( )	4( )	5( )
i. Applicants who have not worked for a number of years but have recently completed refresher courses in science are as good as recent college graduates.	1( )	2( )	3( )	4( )	5( )
j. Men scientists are more career-oriented than women scientists.	1( )	2( )	3( )	4( )	5( )
k. Men scientists are more likely to join professional associations than are women scientists.	1( )	2( )	3( )	4( )	5( )
l. It is not a good company policy to hire older job applicants because they have fewer years left to work.	1( )	2( )	3( )	4( )	5( )

10. As you know, there are many women who enter the job market later in life, often after their children have grown up. How would you describe such job applicants--what strengths and weaknesses do they have?

11. In what ways do such women differ from most of your applicants for scientists positions?

12. About how many such applicants, that it, women who are entering the job market later in life, have you had for scientist positions in the past year?

13. Have you actually hired any such women as scientists?

1( ) Yes 2( ) No

14. Why/why not?

15. Do you expect to hire any in the future?

1( ) Yes 2( ) No

16. Why/why not?

17. What skills do you think are especially important for such women to have for a scientist position with your company?

18. What level of education do you feel such women should have?

19a. How many scientists do you expect to hire next year?

0( ) None (PLEASE GO TO Q. 20)

19b. IF PLANNING TO HIRE:
From what disciplines?

20. As you may know, there are various training programs currently available to women who would like to enter the job market later in life. Thinking only of positions as scientists, what types of training do you think these programs should offer? What would be most helpful to your company?______________________________

____

____

21. Is there anything you think industry might do, either in cooperation with an established program or independently, to train these women for positions as scientists?

____

____

____

22. CHECK: 1( ) Male 2( ) Female

RESPONDENT______________________________ TITLE______________

COMPANY________________________________ PHONE______________

ADDRESS____

CITY________________ STATE__________ ZIP__________________

INTERVIEWER____________________________ DATE_______________

Appendix Q. LIST OF RESPONDENTS TO THE EMPLOYERS' SURVEY

Name of Company	Location	# of employees
Spectra-Physics	Mountainview, CA	1,110
Union Oil Co.	Brea, CA	15,725
Masonite Corp.	St. Charles, IL	7,520
Babcock Industries	Imaca, NY	330
Koch Engineering	Wichita, KS	430
Dayton Walther Corp.	Dayton, OH	2,500
Dayton Power & Light Co.	Dayton, OH	3,137
Seneca Lincoln Foods Corp.	Dantee, NY	1,500
Molded Fiberglass Co's.	Ashtabula, OH	1,000
Kamyr, Inc.	Glenn Falls, NY	104
Country National Bank	Clearfield, PA	75
OIT-MCO International Group	Kansas City, MO	175
Chrysler-Reality Corp.	Troy, MI	128
Samsonite Corp.	Denver, CO	5,000
Motor Freight Express, Inc.	York, PA	1,800
Knudsen Corp.	Los Angeles, CA	2,300
Otagiri Mercantile Co., Inc.	San Francisco, CA	120
Tadkin Corp.	Pittsburgh, PA	100
Union TR BanCorp.	Baltimore, MD	1,704
Simon Brothers	South Bend, IN	175
Auoset Food Corp.	Gustine, CA	300
Bristol Myers Corp.	New York, NY	30,900
Chesebrough-Ponds, Inc.	Trumble, CT	16,000
Taylor Publishing Co.	Dallas, TX	1,500
Albany Steel & Iron Supply Co.	Albany, NY	110
Indiana Farm Bureau Co-op Association	Indianapolis, IN	1,450
Coach & Car Equipment Corp.	Arlington Heights, IL	250
Argo Systems	Sunnyvale, CA	225
Permian Mud Service, Inc.	Odessa, TX	300
Tetra Tech, Inc.	Pasadena, CA	610
Resdel Industries	Pasadena, CA	500
Coherent, Inc.	Palo Alto, CA	500
Ethyl Corp.	Baton Rouge, LA	16,000

(CON'T)

LIST OF RESPONDENTS TO THE EMPLOYERS' SURVEY (CON'T)

Name of Company	Location	# of Employees
Virginia Chemical, Inc.	Portsmouth, VA	923
Olin Corp.	New Haven, CT	22,000
Hensley Industries	Dallas, TX	270
Birdsboro Corp.	Birdsboro, PA	750
Pervel Industries	Plainfield, CT	800
Fenix & Scisson, Inc.	Tulsa, OK	600
Stiefel Laboratories	Oak Hill, NY	300
Resources Sciences Corp.	Tulsa, OK	2,600
Mogul Corp.	Chagrin Falls, OH	1,640
Wyeth Laboratory	Wayne, PA	3,000

APPENDIX H. LIST OF DRI PANEL MEMBERS

- John Alden
  Engineers Counsil for Professional Development
  345 Eeast 47th Street
  New York, New York 10017

  Executive Secretary for the Engineering Manpower; conducted several studies on women and minorities in engineering.

- Eleanor Babco
  American Association for the Advancement of Science, Scientific Manpower Commission
  1776 Massachusetts Avenue, N.W.
  Washington, D.C. 20036

  Consultant to Denver Research Institute

- Geraldine Bean, Ph.D.
  Association of Public College and University Presidents
  Metropolitan State College
  1006 11th Street, Box 68
  Denver, Colorado 80204

  Initiator of Women's Reentry Project at the University of Colorado; Executive Secretary of the Association of Public College and University Presidents; Past member of the University of Colorado Board of Regents.

- Lenore Blum, Ph.D.
  Mills College, Mathematics Department
  700 Euclid Avenue
  Berkeley, California 94709

  Chair, Mathematics Department, Mills College; Association for Women in Mathematics, President.

- Anne Briscoe, Ph.D.
  Professor of Medicine
  Harlem Hospital Center
  135 Street and Lenox Avenue
  New York, New York 10037

Chair, New York Academy of Sciences; Organizing committee for a symposium on "Expanding the Role of Women in Science"; Executive Council Member of the Society of Professional Women; Past president of the Association for Women in Science.

- Janet Brown, Ph.D.
  American Association for the Advancement of Science, Office of
  Opportunities in Science
  1776 Massachusetts Avenue, N.W.
  Washington, D.C. 20036

Director, Office of Opportunities in Science, American Association for the Advancement of Science; Project director on several grants to encourage the participation of women and minorities in science.

- Joan Callanan
  Directorate Science Education
  National Science Foundation
  Washington, D.C. 20050

National Science Foundation program manager for the Career Facilitation Program.

- Nell Dale, Ph.D.
  Assistant Professor
  Computer Sciences Department
  University of Texas, Austin
  Austin, Texas 78712

Project director for the University of Texas, Science Career Facilitation Program; guest lecturer at the University of California, Davis, Science Career Facilitation Program.

- Paul Doigan, Ph.D.
  Manager, Entry Level Recruiting
  Professional Development Operations
  One River Road
  Schenectady, New York 12345

Manager, Entry Level Recruiting and Professional Development Operations, General Electric Company; Chair, Engineering Manpower Commission.

- Louise Fox
  Denver Research Institute
  Denver, Colorado 80208

  Assisted in DRI's evaluation study of the Career Facilitation Program.

- Joe Halpern, Ph.D.
  Associate Division Head
  Denver Research Institute
  Denver, Colorado 80208

- Bob Henze, Ph.D.
  American Chemical Society
  1155 16th Street N.W.
  Washington, D.C. 20036

  American Chemical Society, Chair, Membership; Past president and member of the Scientific Manpower Commission

- Lilli Hornig, Ph.D.
  Wellesley College
  Cheever House
  828 Washington
  Wellesley, Massachusetts 02181

  Chair, Committee on Women in Science, National Academy of Sciences; Chair, Committee on the Education and Employment of Women in Science and Engineering which recently completed a study entitled, "Climbing the Academic Ladder: Doctoral Women Scientists in Academia." Available from the Commission on Human Resources.

- Sheila Humphreys, Ph.D.
  University of California, Berkeley
  CCEW-Women's Center
  Berkeley, California 94720

  Associate Director, CCEW-Women's Center; Project Director, Title I-A Grant, "Reentry Women and Access to the University."

- Linda Ingison, Ph.D.
  National Science Foundation
  Office of Program Integration
  Washington, D.C. 20050

  Project manager to the Denver Research Institute's study of the NSF Career Facilitation Program.

- Alma Lantz, Ph.D.
  Research Psychologist
  Denver Research Institute
  Social Systems Research and Evaluation
  2135 East Wesley
  Denver, Colorado 80208

  Project director for the evaluation of the NSF Career Facilitation Program.

- Karen Sackett
  Research Associate
  Denver Research Institute
  Denver, Colorado 80208

  Assisted in preparation of the final report on the evaluation of the Career Facilitation Program.

- Betty Vetter
  American Association for the Advancement of Science
  Director, Scientific Manpower Commission
  1776 Massachusetts Avenue, N.W.
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  Director, Scientific Manpower Commission, American Association for the Advancement of Science.

- Marna Whittington, Ph.D.
  President, Associates for Research in Behavior
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  Subcontractor to the Denver Research Institute.

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Dr. Lantz worked extensively with motivational and training programs for women. She has recently completed a two-year contract from the National Science Foundation to evaluate 12 projects designed to encourage women to choose science-related careers. She is currently directing a grant from NSF to examine the importance of various factors influencing young women's decisions to take nonrequired mathematics courses; and is funded by the National Institute of Education to determine the social factors within the environment affecting the decision of women to drop out of engineering school. Dr. Lantz is presently directing a three-year grant from the National Institute of Alcohol Abuse and Alcoholism to encourage "boom" towns to initiate primary alcohol prevention programs. She has assisted many agencies in addressing the problems of women and minorities in education, including the National Research Council, the National Institute of Education, the National Science Foundation, Carnegie Foundation, the Department of Labor, the American Association for the Advancement of Science, Education Commission of the States, Research Triangle Institute, the American Society for Engineering Education and the Civil Rights Commission.

Dr. Lantz has worked in a variety of other areas, including a demonstration of the utility of forecasting techniques for decision-making, a NASA-sponsored contract, and an NSF/RANN-sponsored contract to evaluate technology transfer mechanisms. She has also conducted evaluations for the Office of Naval Research and the U.S. Coast Guard.

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Ms. Sackett has a B.A. from the University of Wyoming and an M.A. from the University of Denver.